Precision Cooling
For *Business-Critical Continuity™*

Liebert® DCD™

User Manual

EMERSON
Network Power

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IMPORTANT SAFETY GUIDELINES

SAVE THESE INSTRUCTIONS

Read all installation, operating and safety instructions before proceeding.

WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module.

The Liebert DCD weighs 210 lb. (95kg). Do not leave a Liebert DCD standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert DCD must be supported at all times or laid flat on protective material until it is installed.

Read all instructions before attempting to move, lift, remove packaging from the module, or preparing the module for installation.

WARNING

Risk of improper operation and overpressurization. Can cause equipment or other property damage, injury and death.

Only personnel properly trained and qualified in HVAC installation or service should install or service this equipment.

CAUTION

Risk of contact with sharp edges, splinters and exposed fasteners. Can cause injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from or prepare the module for installation.

NOTICE

Risk of overhead interference. Can cause module or structural damage.

The module may be too tall to fit through a doorway while on the skid. Measure the module and doorway heights and verify clearances by referring to the installation plans and other site-specific drawings and documents before moving the module.

NOTICE

Risk of a leaking coil due to freezing and/or corrosion. Can cause equipment damage and serious building damage.

Cooling and heat rejection coils, heat exchangers and piping systems that are connected to open cooling towers or other open water/glycol systems are at high risk for freezing and premature corrosion. Fluids in these systems must contain the proper antifreeze and inhibitors to prevent freezing and premature coil corrosion. The water or water/glycol solution must be analyzed by a competent water treatment specialist before startup to establish the inhibitor requirement. The water or water/glycol solution must be analyzed every six months to determine the pattern of inhibitor depletion. The complexity of water-caused problems and their correction makes it important to obtain the advice of a water treatment specialist and follow a regularly scheduled maintenance program.

NOTICE

Risk of leaking chilled water lines. Can cause equipment and building damage.

Lines and joints must be inspected regularly. Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment. Do not locate unit directly above any equipment that could sustain water damage. Emerson Network Power recommends installing monitored leak detection equipment for the unit and supply and return lines.

NOTICE

Risk coil and piping rupture. Can cause equipment damage and major fluid leaks resulting in serious building damage, expensive repair costs and costly system down time.

Thermal expansion of the cooling fluid without means of expansion can cause the coil and piping to rupture, spilling cooling fluid in the conditioned space. This can be caused, among other ways, by closing the ball valves on both the supply and the return pipes. Always allow for thermal expansion either by leaving at least one of the valves open or by opening the Liebert DCD's bleed valve (see **Figure 38**).

COMPONENT LOCATIONS AND MODEL NUMBER NOMENCLATURE

Figure 1 Liebert DCD component locations

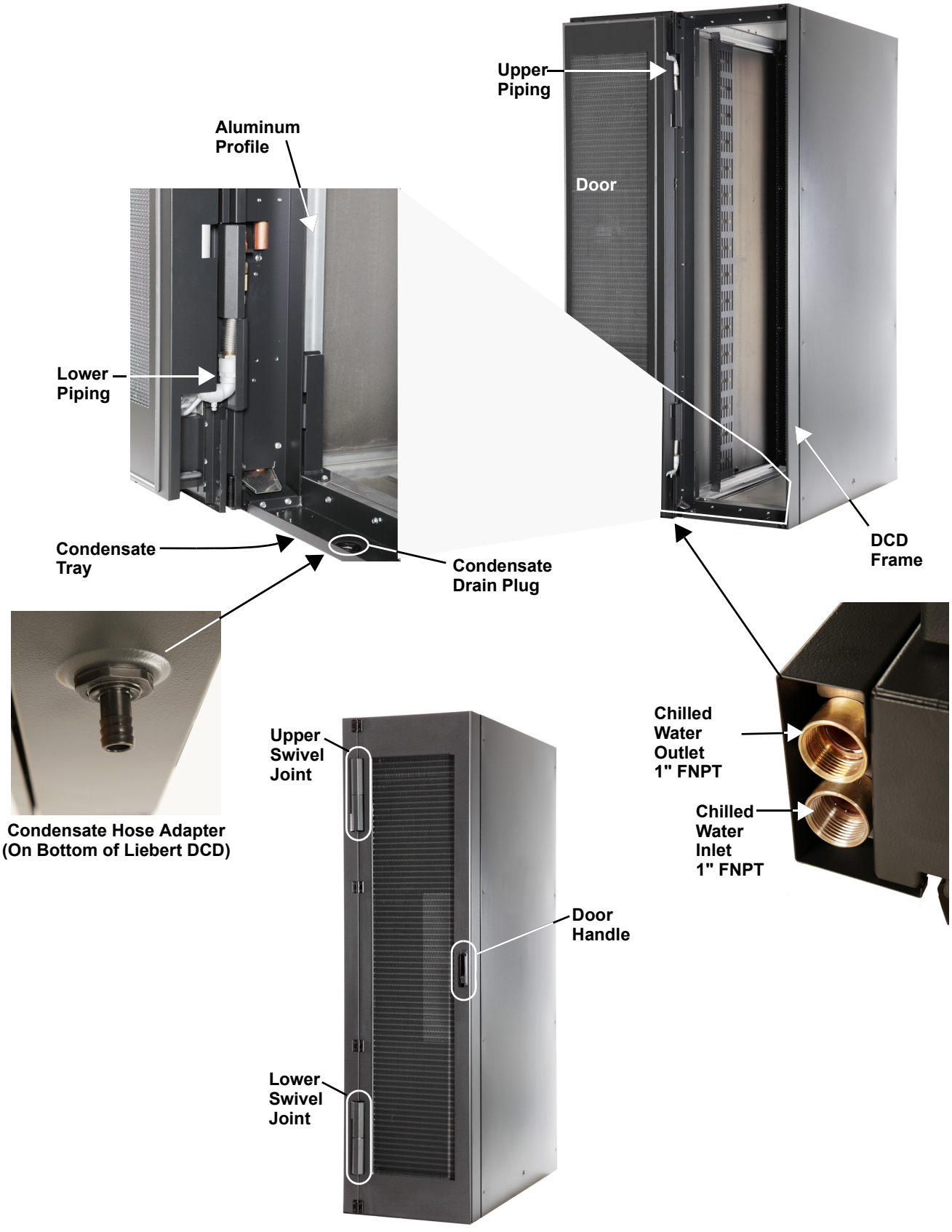


Table 1 Configuration number—Unit code and component location

Model number - part 1/2										Model Details										Part 2/2				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
D	C	D	3	5	A	6	3	3	0	0	0	0	0	0	G	0	0	0	0	S	A	0	0	2

1 - 3 — Product Name

DCD = ENP DCD

4 - 5 — Nominal Cooling Capacity

35 = 35 kW

6 — Rack Height

A = 78-6/8" (2000mm)

7 — Rack Width

6 = 23-5/8" (600mm)

8 — Rack depth

3 = Third-Party Rack Adapter

0 = No Rack

9 — Chilled Water Connection - Hinge Position

3= Bottom - Left

10 — Options

0 = No Options

11 - 15 — Not Used

0 = No Options

16 Color

G = RAL 7021 (dark gray)

17 - 20 — Not Use

0 = No Options

21 — Packaging Type

S = Seaworthy (Air Freight) - Long Distance (Wooden Crate)

22 — SFA (Special Features)

X = SFA’s Included

A = No SFA’s

23 - 25 — Revision Identifier

002

1.0 INTRODUCTION

1.1 References

This document must be used together with site-specific documentation and documentation for other parts of the system.

1.2 Pre-Installation Checks

Check the received materials to be sure all required assemblies and parts have been received. Report any external damage to the shipping company and your local Emerson® representative.

Table 2 Packing list

Part	Part Number	Quantity
Top Swivel Cover (Attaches to Frame)	309617P5	1
Bottom Swivel Cover (Attaches to Frame)	309617P6	1
Top Swivel Cover (Attaches to Door)	309617P7	1
Bottom Swivel Cover (Attaches to Door)	309617P8	1
Self-Adhesive Foam	309894P3	1
Fiber Washers	31074P1	2
Condensate Hose Adapter	080090620	1
Spring Nuts	000782699	16
Diamond Nuts	000770869	7
Grounding Wire	000797999	1
	000798169	1

1.3 Installation Considerations

The Liebert DCD is designed for attachment to the rear of a computer cabinet with side panels. See **3.0 - Mechanical Considerations** for details.

NOTE

The cooling with Liebert DCD works only if a strict air separation exists between server cold air intake and server warm air outlet. Unused rack spaces must be blocked with blanking plates. All bushings (network cables, piping, etc.) must be sealed to prevent air leakage. Racks must have side panels. The tops and bottoms of the racks must be sealed.

1.4 Room Preparation

The room should be well-insulated and must have a sealed vapor barrier. The vapor barrier in the ceiling and walls can be a polyethylene film. Paint on concrete walls and floors should contain either rubber or plastic.

NOTE

The vapor barrier is the most important factor in maintaining environmental control in the conditioned space.

Outside or fresh air should be kept to a minimum when temperature and humidity must be tightly controlled. Outside air adds to the site's cooling, heating, dehumidifying and humidifying loads. Doors must be properly sealed to minimize leaks and must not contain ventilation grilles.

1.5 Storage and Transportation

- Keep the Liebert DCD in its original packaging, protected from the weather and in dry conditions.
- Protect the unit's working parts from sand, rain, dust and other particles and contaminants.
- Store at temperatures between -22°F and +122°F (-30°C and +50°C); the chilled water circuit must be empty during storage.
- After storage for a year or longer, the water-bearing hinges must be inspected for functionality.
- Remove all packaging before starting the unit.
- Chilled water connections are not load-bearing and must not be used as handles.
- When transporting the Liebert DCD, always make sure the device is properly fastened and secured against slipping.

WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module. The Liebert DCD weighs 210lb. (95kg). It must be securely and properly fastened to the forklift or pallet jack, if being used to move the unit.

NOTICE

Risk of a leaking coil due to freezing during improper storage. Can cause equipment and serious building damage.

The heat exchanger and the supply pipes must be cleared of any water before the unit is stored, either before storage or after removal from a cabinet. Compressed air can be used to remove the water. Remove all the vents and the screws before storing.

2.0 GENERAL PRODUCT INFORMATION

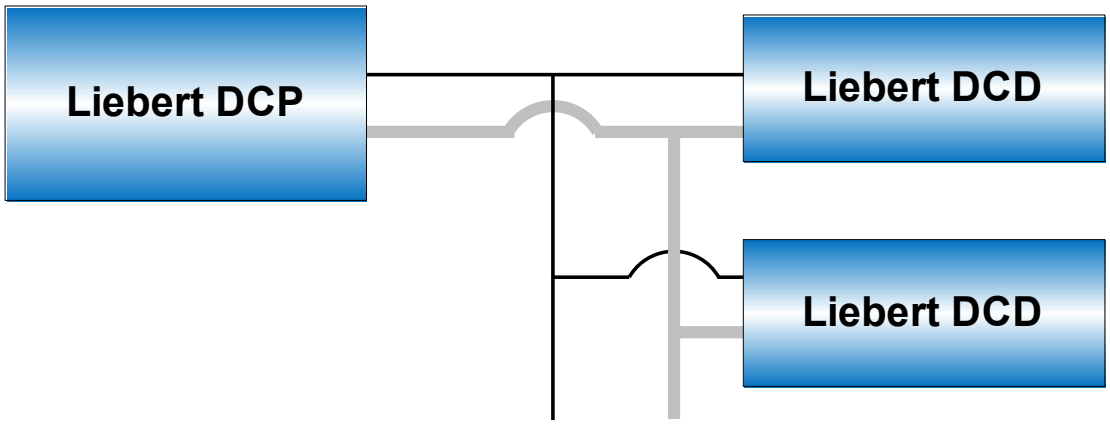
2.1 Product/System Description

The Liebert DCD is an air-water heat exchanger that is integrated into the rear door of a server rack. The Liebert DCD meets the requirements of the EN 60950 standard. The design allows installation on the back of a server cabinet while maintaining access to the back of the servers while the chilled water connections remain stationary. The heat exchanger is suitable for absorbing up to 35kW heat loads from server racks 24" (600mm) x 42U. It can be configured so that no heat is released in the installation area.

Heat produced by internal components (e.g., servers), is reliably removed by the door with a built-in chilled water system or a chilled water distribution unit, such as the Liebert DCP™ (see **Figure 2**). A chilled water distribution unit provides these benefits:

- Isolates the building's chilled water circuit from the chilled water circuit in the data center. The Liebert DCP circulates chilled water to Liebert DCD while preventing condensation by maintaining the water temperature above the room dew point.
- Ensures the proper flow rate to the Liebert DCD. This is critical to achieve and maintaining the needed capacity.
- Minimizes the possibility of a leak within the data center by separating the data center from the building chilled water circuit. Should a leak occur within the data center, the volume of water is limited to the amount in the secondary piping system instead of the amount in the entire building chilled water system.

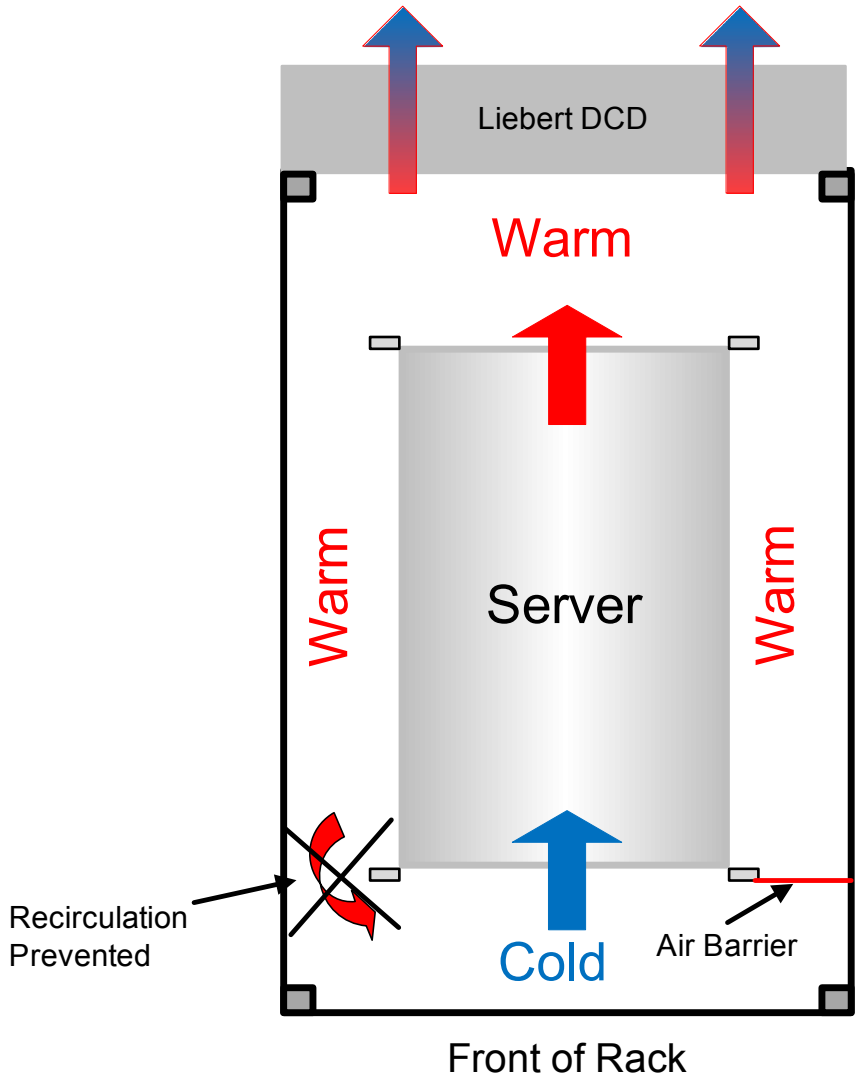
Figure 2 Generic piping layout



Room air is drawn in through the front of the rack and picks up heat from the servers. Cooling occurs when the server exhaust air passes through the Liebert DCD's heat exchanger (see **Figure 3**). The air is moved through the heat exchanger by the server fans.

The Liebert DCD is not expected to produce any condensation because of its location within the conditioned space and if connected to a Liebert DCP or if the chilled water temperature is maintained above the dew point. A condensate pan is provided as a precaution. It has a drain fitting to allow any condensate to be emptied.

Figure 3 Top view of rack with Liebert DCD



2.2 Checking and Unpacking

Upon arrival of the module and before unpacking it, verify that the labeled equipment matches the bill of lading.

Inspect all items for visible and concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Emerson or to your sales representative. If concealed damage is later found, report it to both the shipping company and your local Emerson representative.

Check to be sure all required assemblies and parts have been received.

The Liebert DCD is shipped in protective packaging and secured to a pallet (see **Figure 5**). Do not remove these protective items from the Liebert DCD before it is at the installation location. Exercise care to prevent damage when unpacking and handling the Liebert DCD.

2.2.1 Recycle Packaging

All material used to package this module is recyclable. Please save the material for future use or dispose of it appropriately.

WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module. The Liebert DCD weighs 210 lb. (95kg). Do not leave a Liebert DCD standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert DCD must be supported at all times or laid flat on protective material until it is installed.

CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from or prepare the module for installation.

NOTICE

Risk of a leaking coil due to freezing during improper storage. Can cause equipment and serious building damage.

The heat exchanger and the supply pipes must be drained completely before the unit is stored. Compressed air can be used to remove the water. Remove all the vents and the screws before storing.

NOTICE

Risk of improper storage. Can cause module damage and serious building damage.

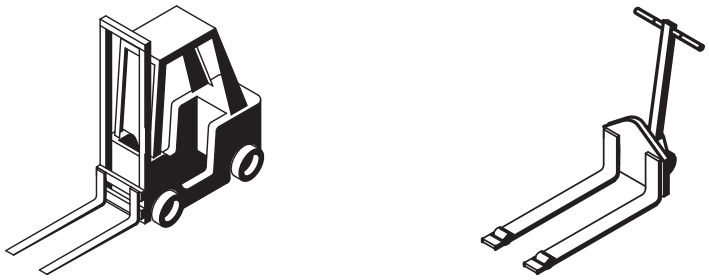
Keep the module indoors and protected from dampness, freezing temperatures and contact damage.

NOTICE

Risk of damage from forklift. Can cause exterior and/or underside damage.

Keep the forklift's tines level and at a height suitable to fit below the skid.

Figure 4 Recommended module handling equipment



2.2.2 Module Handling

WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module. The Liebert DCD weighs 210 lb. (95kg). Do not leave a Liebert DCD standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert DCD must be supported at all times or laid flat on protective material until it is installed.

Exercise care to prevent damage when unpacking and handling the module.

Use a forklift or pallet jack to move the Liebert DCD. If multiple Liebert DCD modules are delivered, they will be shipped on a pallet with up to four modules. A pallet jack will be required to move these modules to the installation location.

Ensure that the fork tine length is suitable to safely move the packaged module.

Units may be stacked up to four units high if multiple units are ordered. If stacked units are received, cut the bands securing them together and place all packages on the floor beginning to unpack them.

Keep modules in the protective packaging until they have been moved to the installation site.

When handling and unpacking the module, exercise great care to prevent damage.

Do not lift modules higher than 6" (152mm) while moving them. If a unit must be lifted higher than 6" (152mm), exercise great care and keep all personnel who are not helping move them at least 20 feet (5m) away from the modules.

Do not use module piping to lift or move the Liebert DCD.

2.2.3 Unpacking the Module.

WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module. The Liebert DCD weighs 210 lb. (95kg). Do not leave a Liebert DCD standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert DCD must be supported at all times or laid flat on protective material until it is installed.

CAUTION

Risk of sharp edges and splinters. Can cause injury.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from or prepare the unit for installation.

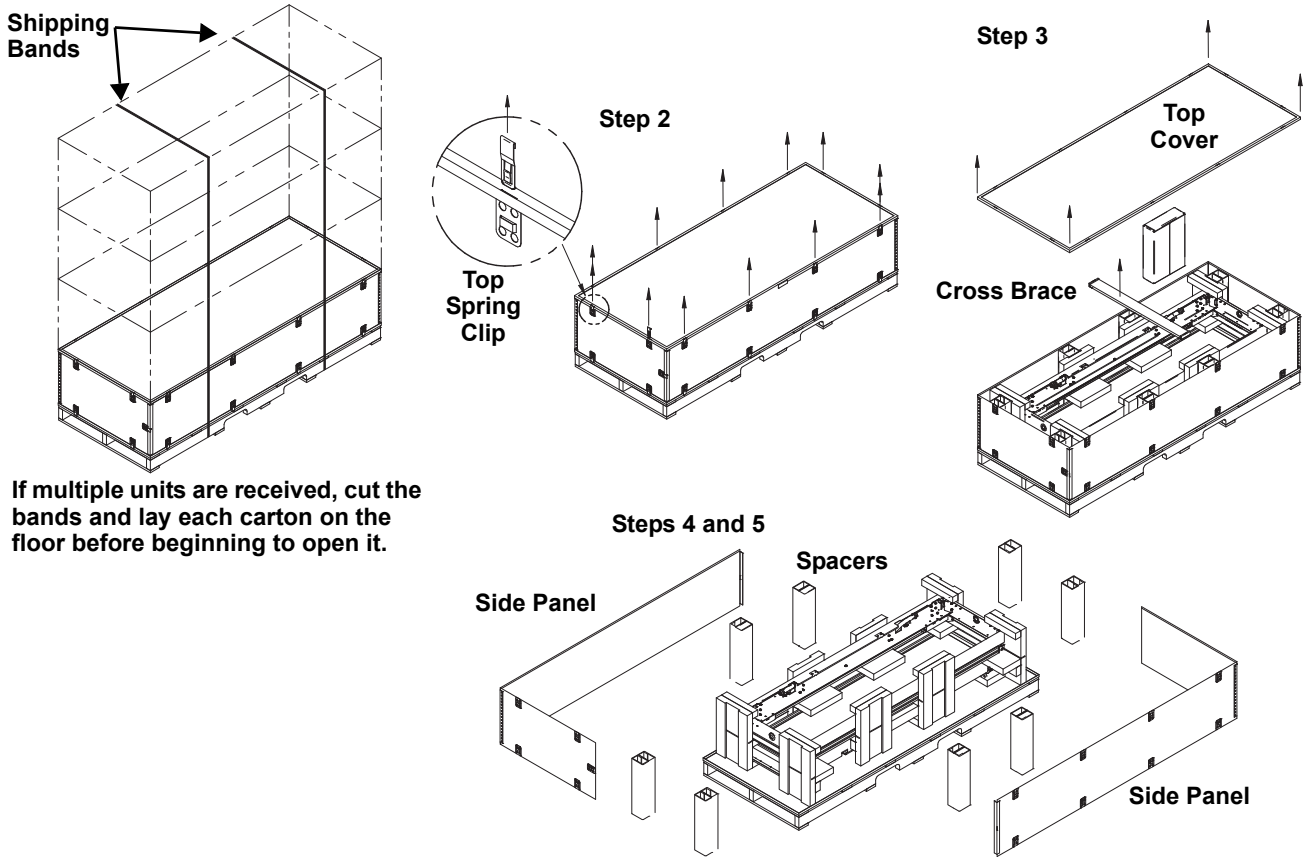
Required Tools

- Utility knife
- Flat-blade screwdriver, claw hammer, pliers or crowbar
- Forklift, pallet jack or similar device

Do not unpack the Liebert DCD before moving it to the installation location. Once at the installation point:

1. **Multiple Unit Shipments**—Cut the bands and place all packaged modules on the floor for unpacking.
2. Slide the upper row of spring clips upward and remove them (**Figure 5**).
3. Remove the top cover and cross brace from the package.
4. Remove and set aside the hardware and key package.
5. Remove the remaining spring clips, side panels and any spacers from the package.

Figure 5 Removing packaging

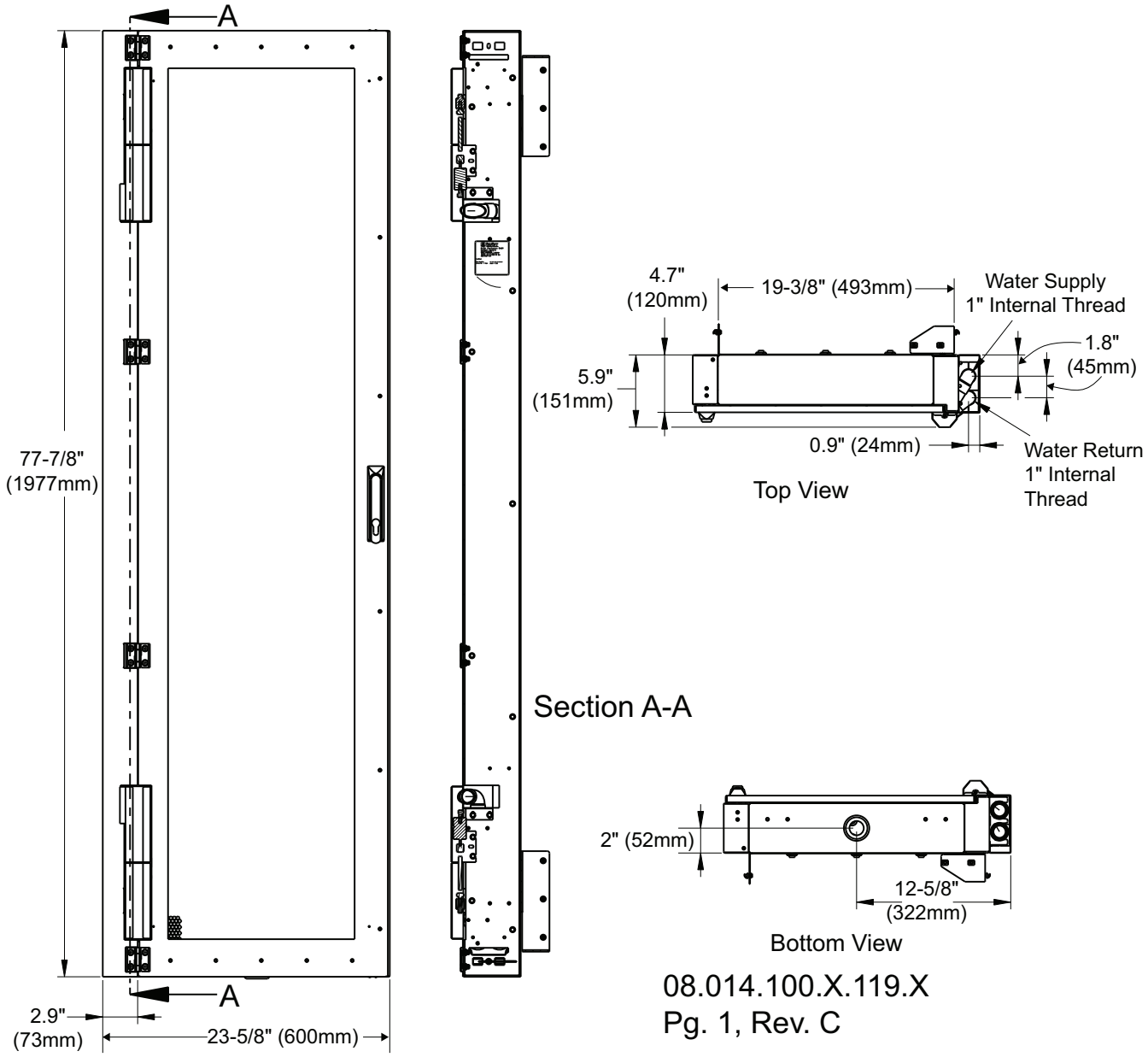


6. Lay two pieces of protective material, each longer and wider than the Liebert DCD frame, on the floor.
7. Remove foam packaging from both sides of the unit.
8. At least two properly trained and qualified people may lift the Liebert DCD frame off the pallet and lay it on one piece of protective material.
9. Compare the serial tag information on the Liebert DCD to the bill of lading. If the information does not match the product specified, contact your local sales representative.
10. At least two properly trained and qualified people may lift the Liebert DCD door off the pallet and lay it on the second piece of protective material with the door handle facing up.

3.0 MECHANICAL CONSIDERATIONS

3.1 Liebert DCD Dimensions

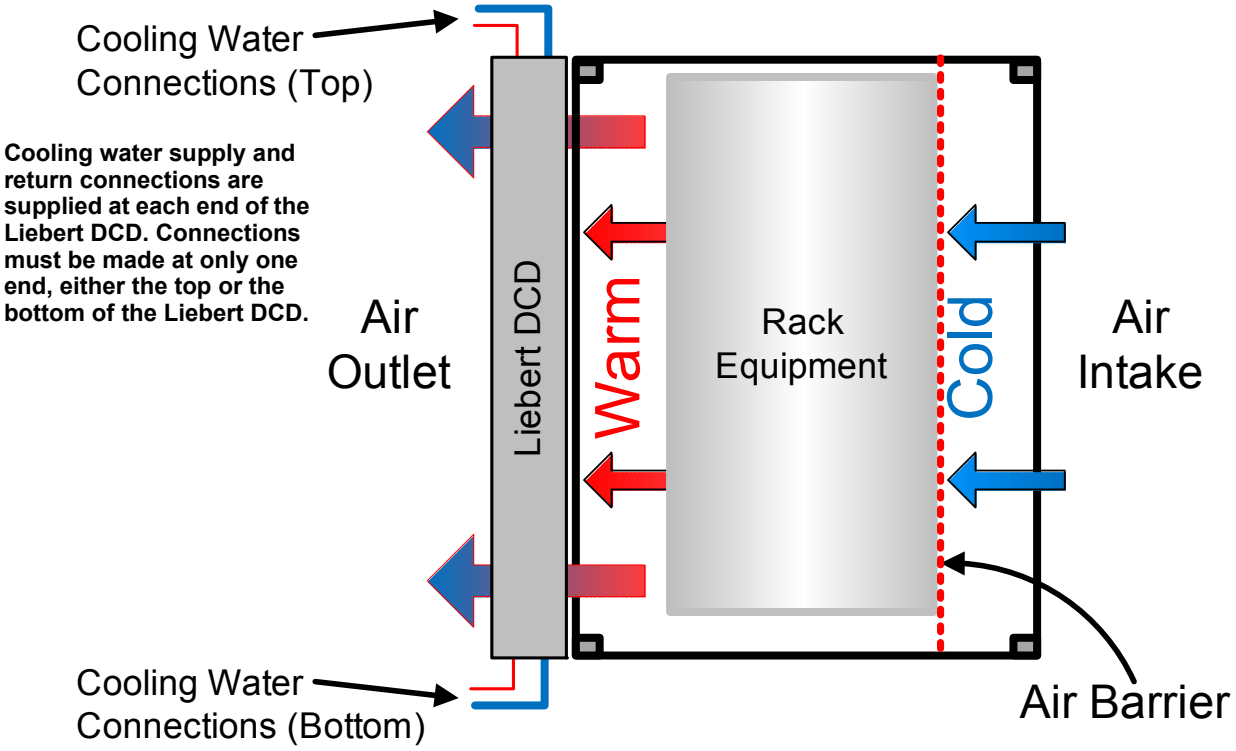
Figure 6 Liebert DCD door dimensions



3.2 Cooling Principle

The server fans force air heated by the rack equipment through the unit's air-water heat exchanger where it is cooled. The air side pressure drop-flow rate dependency curve is shown in **Figure 45**.

Figure 7 Side view of rack with Liebert DCD


Cooling Water Connections (Top)
Cooling water supply and return connections are supplied at each end of the Liebert DCD. Connections must be made at only one end, either the top or the bottom of the Liebert DCD.
Air Outlet
Liebert DCD
Warm
Rack Equipment
Cold
Air Intake
Cooling Water Connections (Bottom)
Air Barrier

NOTE

Before using the Liebert DCD, the system and rack equipment must be checked to determine whether they match hydraulically. In particular, the server fans must be able to generate sufficient pressure to drive the air through the Liebert DCD.

NOTE

In case of chilled water supply system failure, the cooling is provided either by adjacent Liebert DCD's and/or the room cooling system. In this case, the equipment waste heat is released into the room.

3.3 Determining Placement in the Conditioned Space

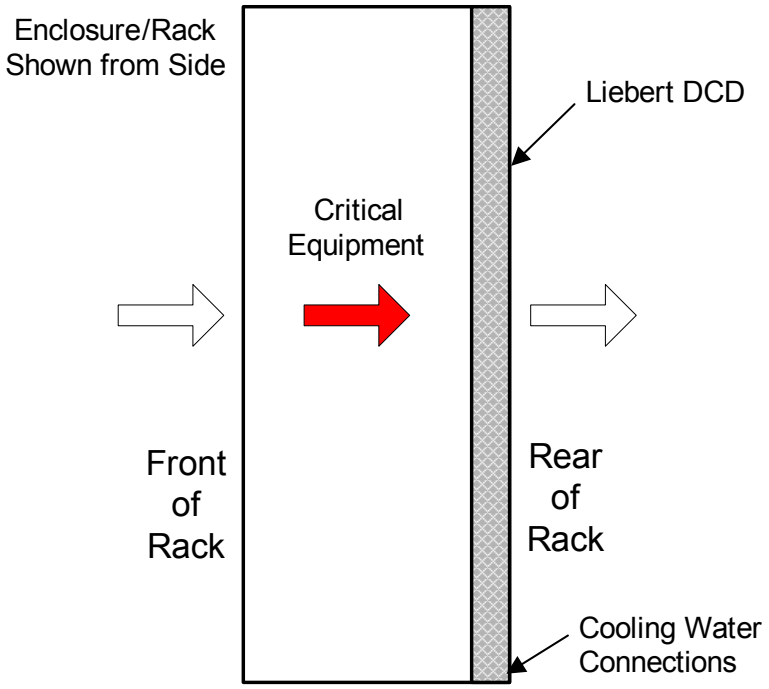
Refer to site-specific drawings for exact placement. Efficient cooling depends on proper equipment placement, proper use of plates in any voids in the rack and good cable management.

Ensure that there is 25.6" (649mm) clearance in the rear to allow the door to open fully.

3.4 Air Flow

The server fans draw air into the rack where the equipment heats it. The server fans force the heated air across the Liebert DCD coil. The Liebert DCD has a low air-side pressure drop, similar to a rack with perforated doors.

Figure 8 Generic airflow diagram



NOTE

To provide optimal cooling, strict separation between the hot and cold air must exist within the rack and all the bushings (network cables, piping, etc.) must be sealed to prevent air leakage. Air bypass and recirculation can severely reduce the cooling effectiveness of the Liebert DCD.

Blanking plates must be installed in any voids in the rack to prevent air bypass and air recirculation. Keep the Liebert DCD's coils clear of any obstructions that may block the airflow.

Contact the factory for further information. Refer to the user manual supplied with the rack the Liebert DCD is mounted on.

3.5 Water Quality

For reliable function of the Liebert DCD, chilled water must be available in an appropriate amount, at the appropriate temperature and pressure. The water quality must be in accordance with VGB-R 455 P. (see **8.1 - Water Quality**)

3.6 Water Temperature

The cold water supply temperature must be higher than the dew point temperature of the cold space. Failure to maintain the cold water supply temperature above the room dew point will result in condensation. The Liebert DCD is designed only for sensible cooling; dehumidification of the room by means of the Liebert DCD must be avoided. The built-in condensate tray with condensate drain is designed only for a short-term condensation.

Table 3 Application conditions

Operating Ambient Temperature	50°F - 95°F (10°C - 35°C) (Other Temperatures on Request)
Maximum Absolute Air Humidity on Site	8g/kg
Chilled Water Temperature Intake	53.6°F (12°C) Other Temperatures on Request
Chilled Water Temperature Outlet	64.4°F (18°C) Other Temperatures on Request)
Water Temperature Difference	10.8°F (6°K)
Use of Glycol	On Request (Not Recommended)
Chilled Water Connection	Rack - Rear Side (Top or Bottom Connection); 1" NPT
Condensate Tray Drain Connection	Rack - Rear Side; 5/8"
Maximum Operating Pressure	145psi (10bar)

4.0 INSTALLATION

These instructions apply only to installing the Liebert DCD on a DCM™ rack by Knurr®. For racks built by other makers, refer to the instruction sheet shipped with the adapter kit to install the adapter and Liebert DCD frame.

WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module. The Liebert DCD weighs 210lb. (95kg). Do not leave a Liebert DCD standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert DCD must be supported at all times or laid flat on protective material until it is installed.

NOTICE

Risk of improper installation and commissioning. Can cause equipment damage.

Installation and commissioning of the Liebert DCD must be performed only by properly trained and qualified personnel. All actions must be in accordance with regulations and the manufacturer's instructions.

NOTICE

Risk of improper assembly. Can cause unit to malfunction.

The Liebert DCD must be properly aligned and plumb with the rack to for the unit to function properly and without water leaks. Use a carpenter's level to make sure this requirement is met when commencing the installation.

The hot and cold air within the case must be separated.

NOTICE

Risk of airflow obstructions. Can cause improper air circulation.

To ensure sufficient air circulation make sure there are no obstructions (e.g. packaging materials, tools etc.) left in the unit or cabinet. In particular, check the Liebert DCD's grids, heat exchanger, air intake and the air outlet.

4.1 Liebert DCD Frame Preparations

The Liebert DCD mounts on the rear of the rack.

- **Before attaching the frame**: remove the rear door from the rack. Refer to the rack's installation manual for details.
- **If the Liebert DCD was supplied with an aluminum profile** and will be attached to a DCM rack:, remove the profile from the Liebert DCD by removing the screws.

NOTE

If installing the Liebert DCD on any type of rack other than the DCM, an adapter kit is necessary. Follow the installation instructions included with the rack adapter kit for the specific rack. Once the adapter kit and frame are installed, continue the installation, following the steps in ***4.3 - Installing the Liebert DCD Door****.*

4.2 Installing the Liebert DCD Frame on a DCM Rack

4.2.1 Required Tools

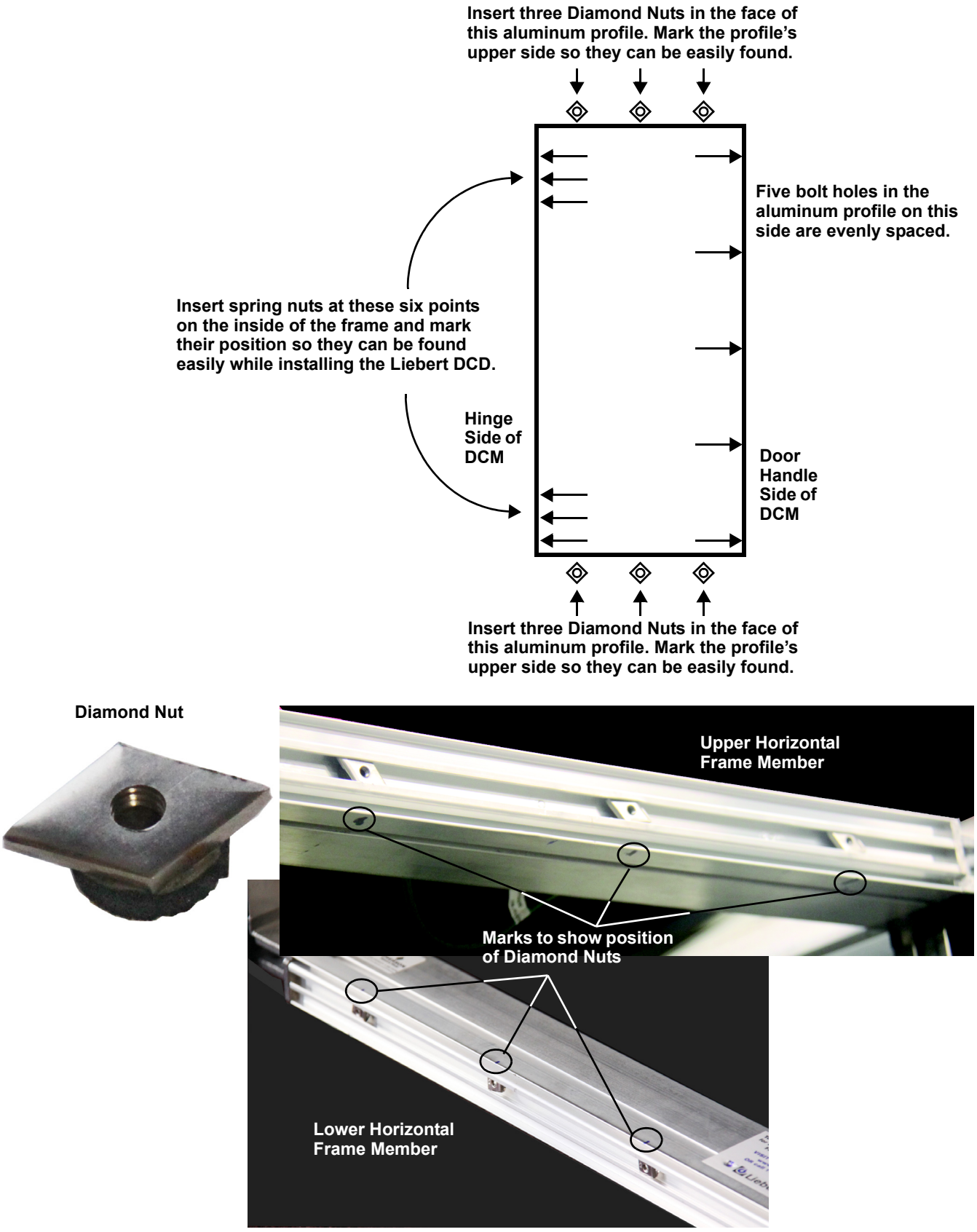
- Phillips screwdriver, PH3
- Adhesive-backed foam (factory-supplied)
- Utility knife
- 8mm socket and driver
- Scratch awl
- Marker
- Adjustable wrench with a maximum adjustment size of 2 inches (51mm)
- Torque wrenches, 1-1/2in (38mm) and 1-7/16 (36mm)

Table 4 Required factory-supplied parts

Part Name	Liebert Part #	Quantity
Spring Nuts	000782699	16
Diamond Nuts	000770869	7
Self-Adhesive Foam	309894P3	1
Bolts		
Condensate Drain Kit		

1. After removing the packaging, lift the Liebert DCD from the pallet or from the protective material.
2. Align the frame of the Liebert DCD with the rear of the equipment rack.
   - **Bottom Chilled Water Connections**: ensure that the chilled water connections are pointing down (see **Figure 1**).
   - **Top Chilled Water Connections**: rotate the frame 180°. Align the frame of the Liebert DCD with the rear of the equipment rack.
3. Use a marker or scratch awl to mark the positions for the 17 bolts that will attach the frame to the DCM (refer to **Figure 9**). Bolts will be inserted in:
   - Five frame holes on the aluminum frame member on the door handle side of the rack.
   - Three spring nuts near the top of the hinge side of the rack
   - Three spring nuts near the bottom of the rack
   - Three diamond nuts in the face of the rack's top frame member
   - Three diamond nuts in the face of the rack's bottom frame member

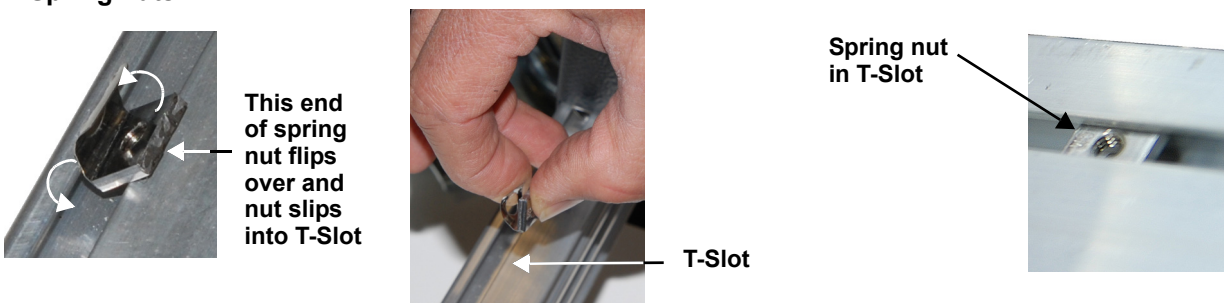
Figure 9 Position of frame holes, spring nuts and diamond nuts on the DCM


Insert three Diamond Nuts in the face of this aluminum profile. Mark the profile's upper side so they can be easily found.
Five bolt holes in the aluminum profile on this side are evenly spaced.
Insert spring nuts at these six points on the inside of the frame and mark their position so they can be found easily while installing the Liebert DCD.
Hinge Side of DCM
Door Handle Side of DCM
Insert three Diamond Nuts in the face of this aluminum profile. Mark the profile's upper side so they can be easily found.
Diamond Nut
Upper Horizontal Frame Member
Marks to show position of Diamond Nuts
Lower Horizontal Frame Member

4. Lay the Liebert DCD frame on the protective material.

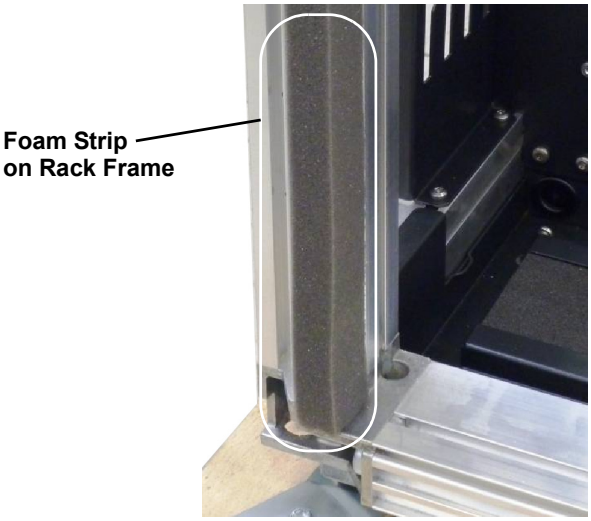
5. Insert the spring nuts into the groove of the vertical aluminium profile (see **Figure 10**).
6. Move spring nuts to the marked positions using a scratch awl or similar tool.

Figure 10 Spring nuts



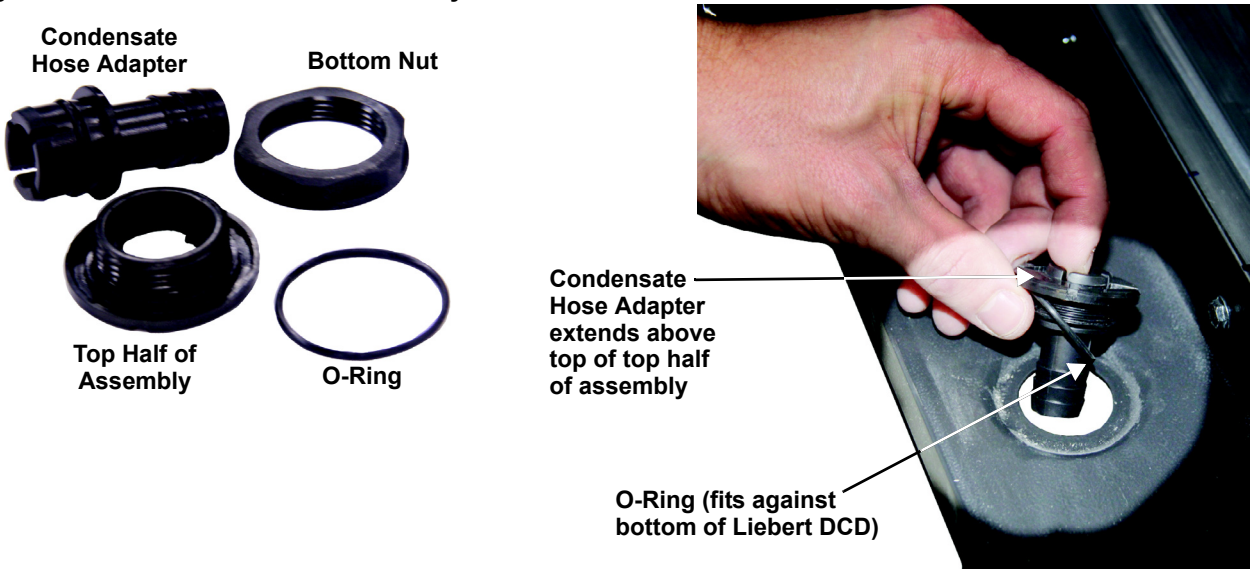
7. Insert three diamond nuts into the groove of each horizontal member of the rack aluminium profile in the marked positions (see **Figure 9**). The diamond shape prevents them from turning while being tightened
8. Attach the self-adhesive foam strip on the hinge side of the aluminium profile to seal the gap between the rack and the Liebert DCD's frame.
9. Trim the foam strip if necessary (see **Figure 11**).

Figure 11 Applied foam strip



10. Install the condensate drain assembly (refer to **Figure 12**).
    a. Get the condensate drain parts from the parts bag.
    b. Press the Condensate Hose Adapter into the top half of the drain assembly until it snaps into place. The top of the Condensate Hose Adapter will extend above the top half of the drain assembly.
    c. Put the O-ring seal on the insert.
    d. Insert the assembly in the top of the condensate drain hole.
    e. Screw the nut onto the top half of the assembly, tightening it firmly by hand.

Figure 12 Condensate drain assembly


Condensate Hose Adapter
Bottom Nut
Top Half of Assembly
O-Ring
Condensate Hose Adapter extends above top of top half of assembly
O-Ring (fits against bottom of Liebert DCD)

11. Connect the Condensate Hose Adapter to the Condensate Tray.
12. Lift the Liebert DCD frame and align it with the server rack again.

Figure 13 Align the Liebert DCD frame with the rack

13. Insert and partly tighten bolts to hold it in place.

NOTE

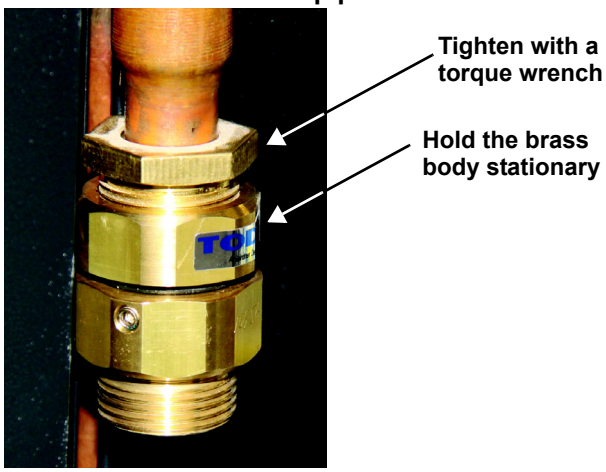
Performing this step may be easier if a board or similar object is placed under the DCD frame to hold it in place.

14. Insert and lightly tighten the bolts, working all around the perimeter to prevent the frame from twisting and to ensure the parts fit properly (see **Figure 14**).
15. Torque the screws all around the perimeter to 2 ft-lb (3 Nm).
16. Verify that the frame is not twisting.

Figure 14 Tighten screws on frame

17. Thread the brass swivel fitting to the frame by hand to ensure the threads mate properly.
18. Hold the brass body so that it does not rotate and use a torque wrench to tighten to 64 ft-lb (85Nm).

Figure 15 Brass swivel fitting threaded onto Liebert DCD pipe



4.3 Installing the Liebert DCD Door

Required Tools

- Socket hexagonal screw driver - (Allen) 8mm for M5 screws (5/16")
- Torque wrench
- Phillips screw driver PH3
- Utility knife

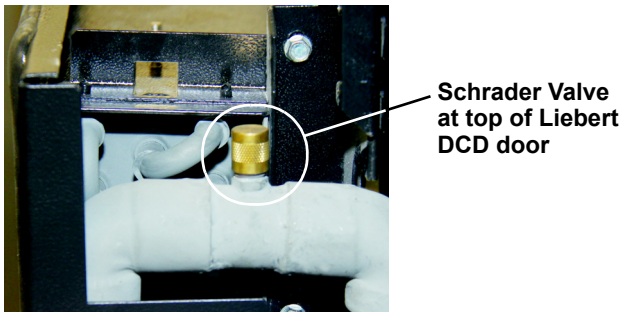
WARNING

Risk of heavy module falling. Can cause equipment damage, injury and death.

Two properly trained and qualified people are required to move and install the module. The Liebert DCD weighs 210 lb. (95kg). Do not leave a Liebert DCD standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert DCD must be supported at all times or laid flat on protective material until it is installed.

1. Attach the three door hinges to the Liebert DCD door with the supplied screws.
2. Turn the Liebert DCD face down (handle side down) and lay it on the protective material.
3. Vent the low-pressure holding charge in the Liebert DCD by removing the cap on the Schrader valve and depressing the valve pin.
4. Replace and secure the cap on the Schrader valve.

Figure 16 Schrader valve



5. Loosen the coil plug. This requires two adjustable wrenches in the wrench arrangement shown in **Figure 17**.

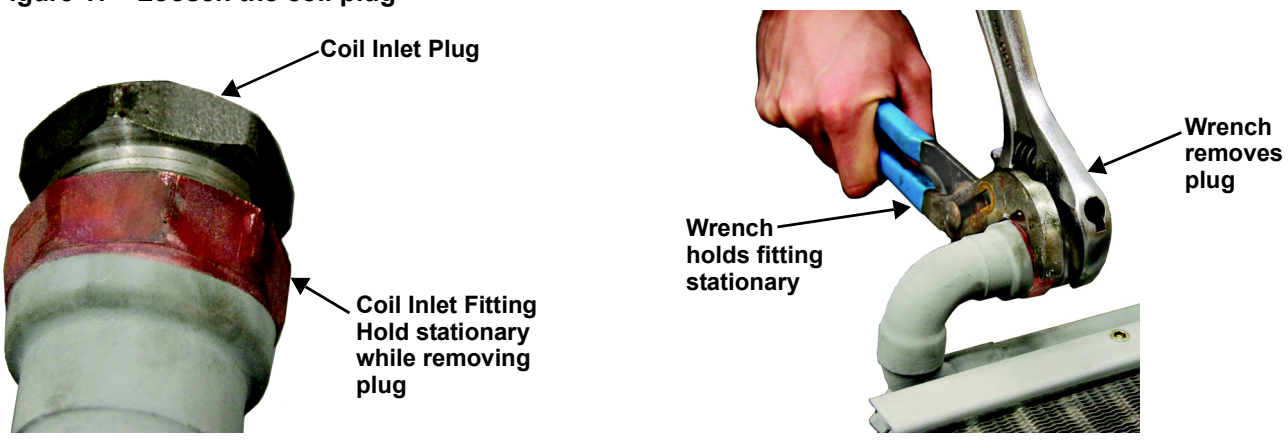
   One wrench holds the Coil Inlet Fitting stationary and the other turns the plug to remove it.

NOTICE

Risk of improper coil plug removal. Can cause damage to the coil.

It is imperative that the coil inlet fitting is held stationary and the coil plug is turned. Turning the coil inlet fitting can damage the coil.

Figure 17 Loosen the coil plug



6. Remove any debris and wipe the threaded surfaces clean.
7. Align the door to the frame (see **Figure 18**).
8. Set the door in the frame—Angle the bottom of the door toward the frame and insert the door (see **Figure 18**).

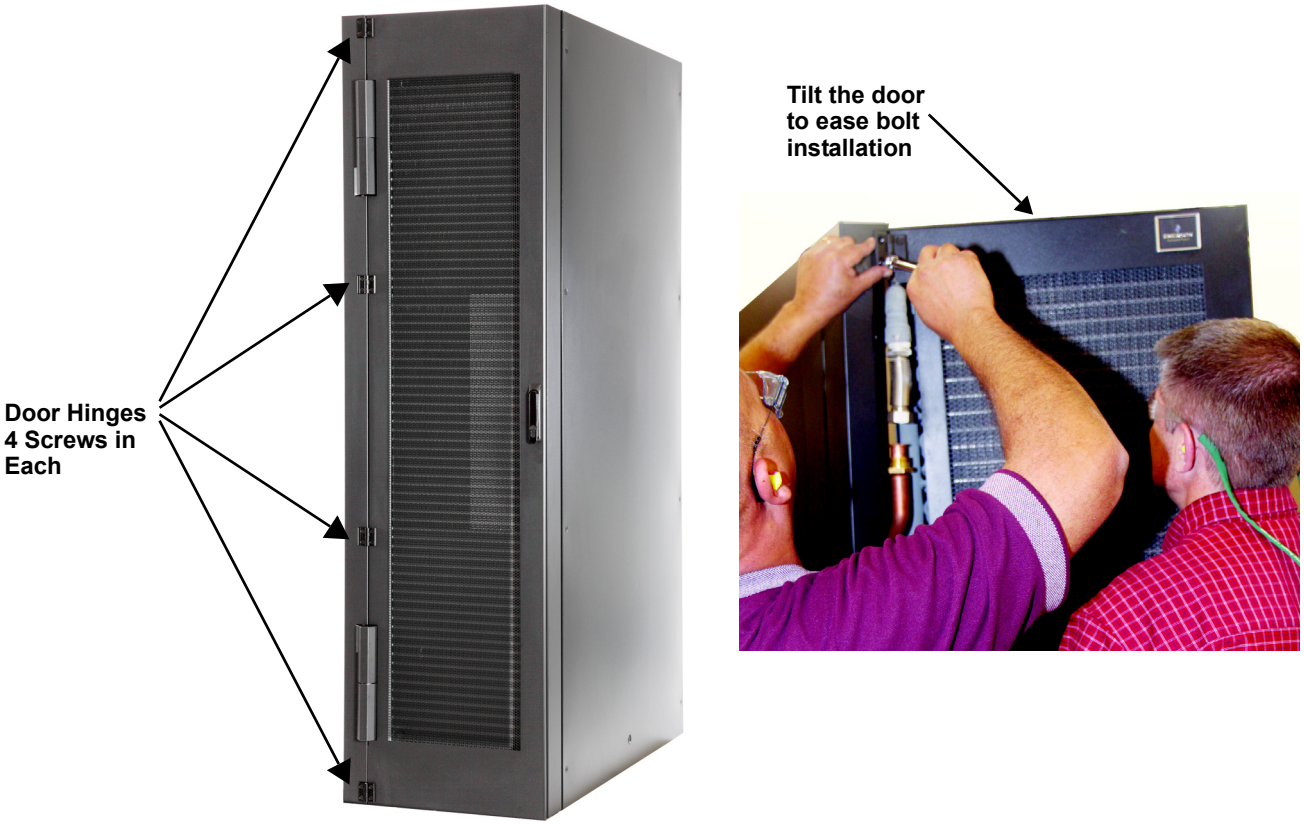
NOTE
Performing this step may be easier if a board or similar object is placed under the DCD frame to hold it in place.

Figure 18 Frame and door alignment

9. Fasten the door hinges to the frame, starting with the top hinge and finishing with the bottom hinge (see **Figure 19**).

NOTE
Tilting the door may ease installing the hinge bolts.

Figure 19 Liebert DCD door hinge location



10. Check that the door moves freely.
    If there are any irregularities or roughness in the movement of the door:
    - Check for obstructions or loosen screws of the hinges and adjust alignment.
    - Tighten any loose screws.
11. Apply pipe wrap or plumber's dope to the coil connection.
12. Thread one of the short, flexible pipes onto the coil connection by hand to ensure that the threads properly mate (see **Figure 20**).
13. Tighten to 350 in-lb (39.5Nm).

NOTICE

Risk of improper tightening. Can cause equipment damage.

Turn only the nut on the flexible pipe when tightening this connection. Moving the coil connection may damage the coil.

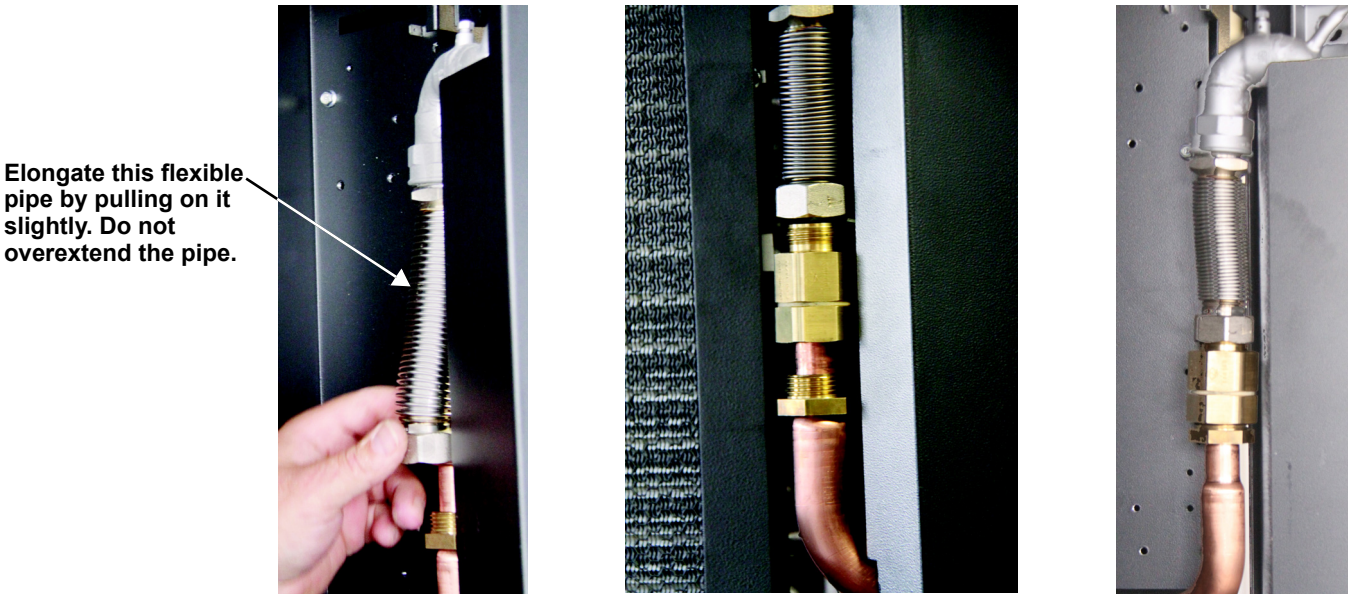
14. Pull the flexible piping slightly to elongate it enough to connect the union nuts.

NOTICE

Risk of overextending the flexible pipe. Can cause equipment damage.

Pull the flexible piping slightly to elongate it. This makes the piping long enough to connect the union nuts. Only a slight elongation is necessary. Pulling too hard will overextend the pipe, making it hard to fit and possibly causing leaks.

Figure 20 Aligning pipes



15. Insert the sealing ring in the door's lower piping (see **Figure 21**).

Figure 21 Inserting sealing ring

16. With the door fully open, use a torque wrench tighten the union nuts to 64 ft-lb (85Nm). If a torque wrench is not available, use two wrenches to reduce the stress on the pipes (see **Figure 22**).
    - Open-end wrench 1-5/8" (41mm) or an adjustable wrench with maximum size of 2" (51mm)
    - Open-end wrench 1-7/16" (36mm) or an adjustable wrench with maximum size of 2" (51mm)

Figure 22 Tightening piping

17. Check to ensure the door swings freely.

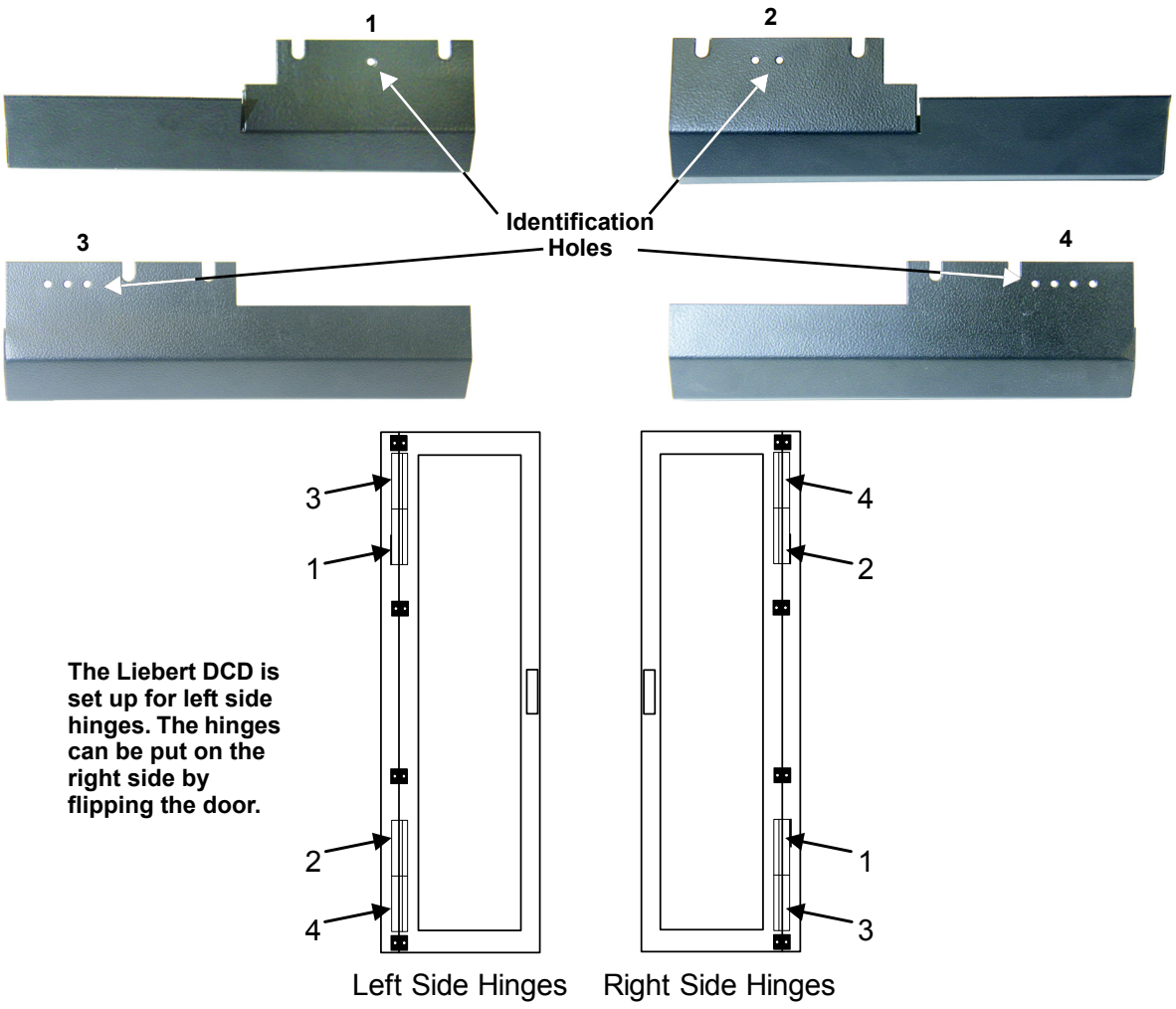
4.4 Installing the Liebert DCD Swivel Joint Covers

Too Required

- Socket hexagonal screw driver - 5/16" Allen (8mm) for M5 screws

The Swivel Joint Covers can be identified by the number of identification holes on each cover.

Figure 23 Swivel joint cover identification and location



1. Open the Liebert DCD door; the door must be open for the Swivel Joint Covers to be installed.
2. Install the outer Swivel Joint Covers on the door (see **Figure 24**)
3. Install the inner Swivel Joint Cover on the frame (see **Figure 25**).

Figure 24 Outer swivel joint cover locations

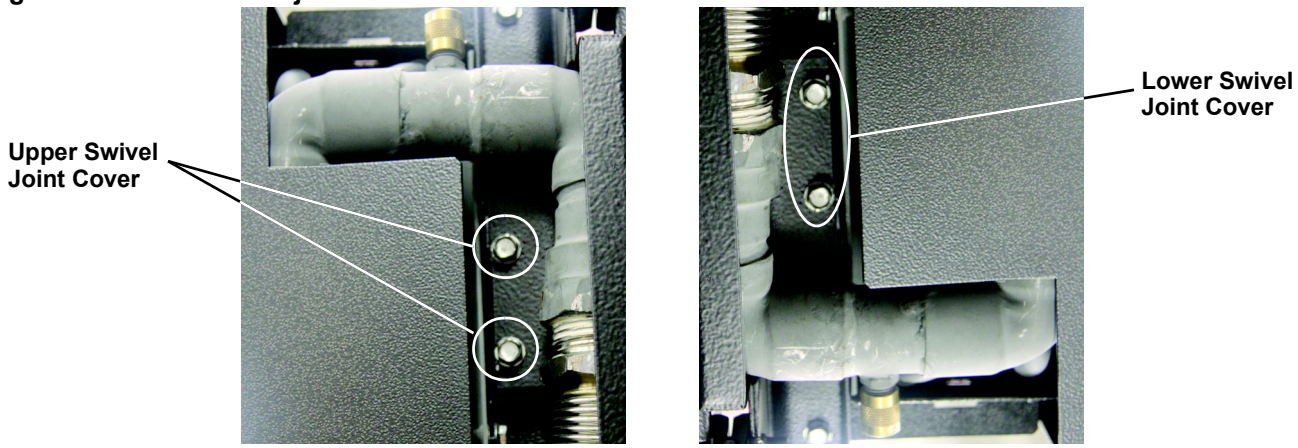
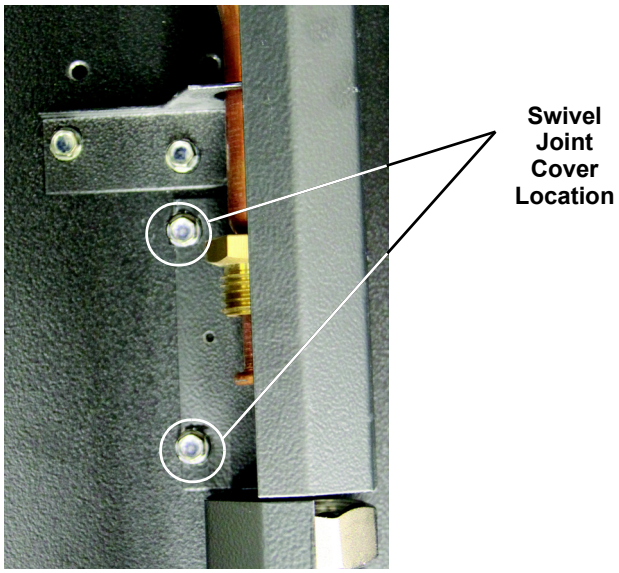
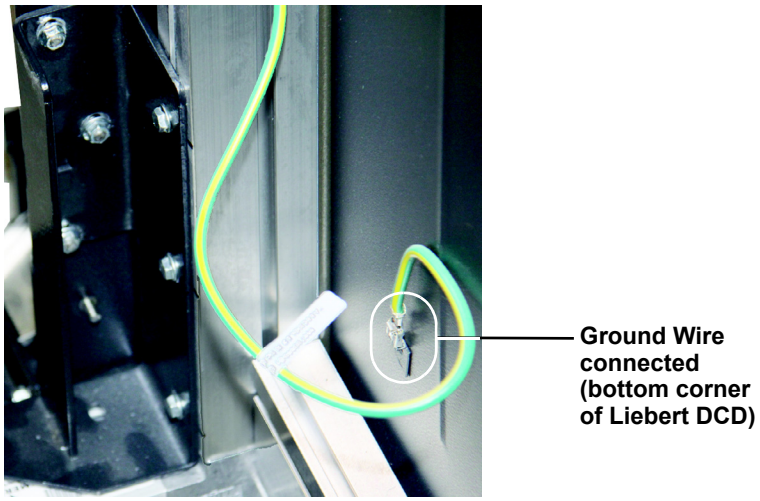


Figure 25 Inside swivel joint cover locations



4. Fasten screws using the hexagonal screwdriver or socket wrench.
5. Connect the earth (ground) wire of the door to the frame of the Liebert DCD (see **Figure 26**).

Figure 26 Securing ground wire



6. Use a “diode” or multimeter to determine that the connection is properly grounded.
7. Check functionality of the door lock. The Liebert DCD is equipped with a half-inch cylinder lock and keys.

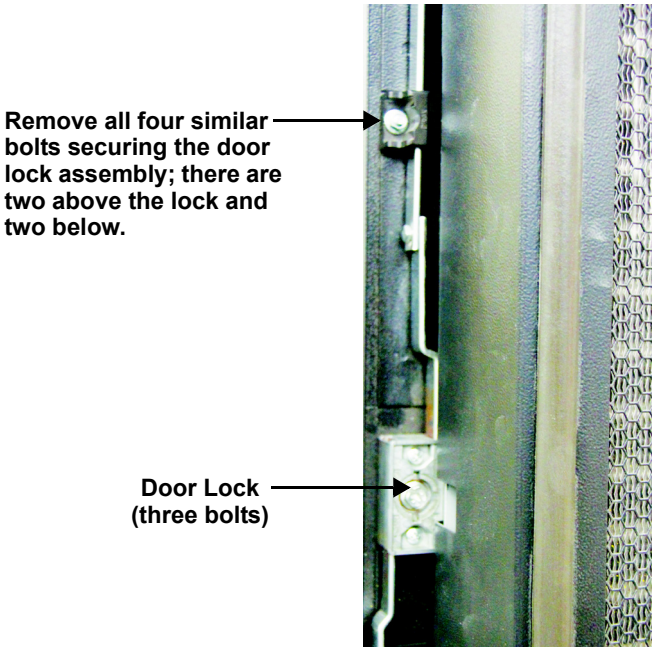
4.5 Reversing Door Handle

If installing the Liebert DCD for top chilled water connection, the handle would be upside down. The handle will function but can be reversed for convenience.

To reverse the handle:

1. Open the door and remove all the bolts holding the door handle and lock assembly, including the four brackets. Studs and nuts secure the brackets to the door frame.
2. Flip the door handle and lock assembly 180 degrees and reattach it with the bolts and nuts.
3. Check the handle and lock to ensure they operate properly.

Figure 27 Reverse door handle


Remove all four similar bolts securing the door lock assembly; there are two above the lock and two below.
Door Lock (three bolts)

5.0 PIPING

Refer to site-specific drawings for general locations of the piping connections. The drawings should specify where the piping connects to the Liebert DCD.

NOTICE

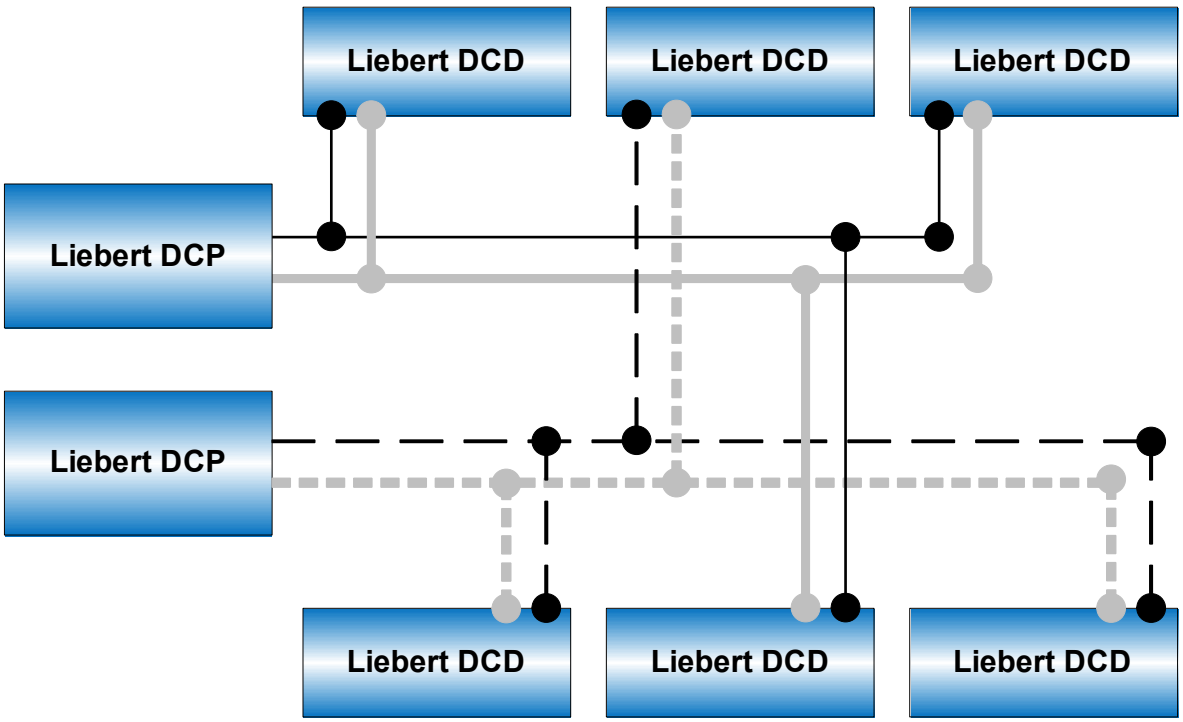
Risk of coil and piping rupture. Can cause equipment damage and major fluid leaks resulting in serious building damage, expensive repair costs and costly system down time.

Thermal expansion of the cooling fluid without means of expansion can cause the coil and piping to rupture, spilling cooling fluid in the conditioned space. This can be caused, among other ways, by closing the ball valves on both the supply and the return pipes. Always allow for thermal expansion either by leaving at least one of the valves open or by opening the Liebert DCD's bleed valve (see **Figure 38**).

5.1 System Connection Configuration

If possible when using a chilled water distribution unit such as the Liebert DCP™, connect the Liebert DCD in an interlaced configuration (see **Figure 28**). In an interlaced configuration, half the cooling modules in an aisle are connected to one chilled water distribution unit and the other half are connected to another chilled water distribution unit. Interlacing the connection piping will keep half the Liebert DCD units operating and maintain cooling in the conditioned space should one chilled water distribution unit fail.

Figure 28 Typical Liebert DCD interlaced piping



When using a chilled water distribution unit such as the Liebert DCP, a ring design (see **Figure 29**) or Tichelmann ring (see **Figure 30**) design may be employed. In these designs, the pressure drop for each of the units is approximately the same, which results in even cooling performance.

Figure 29 Ring piping

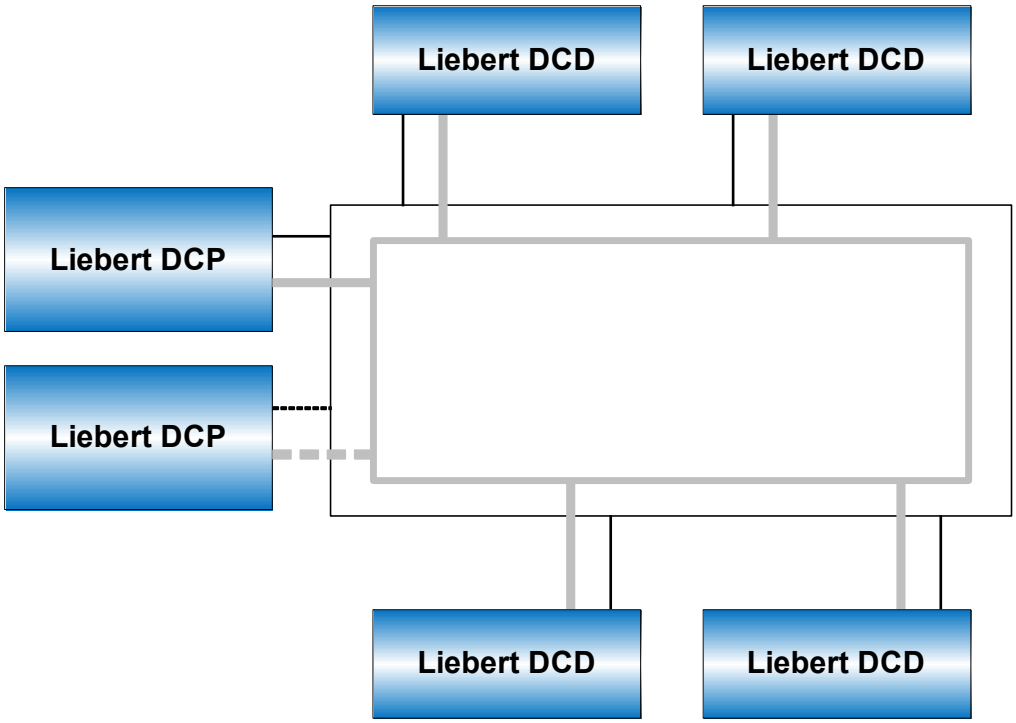
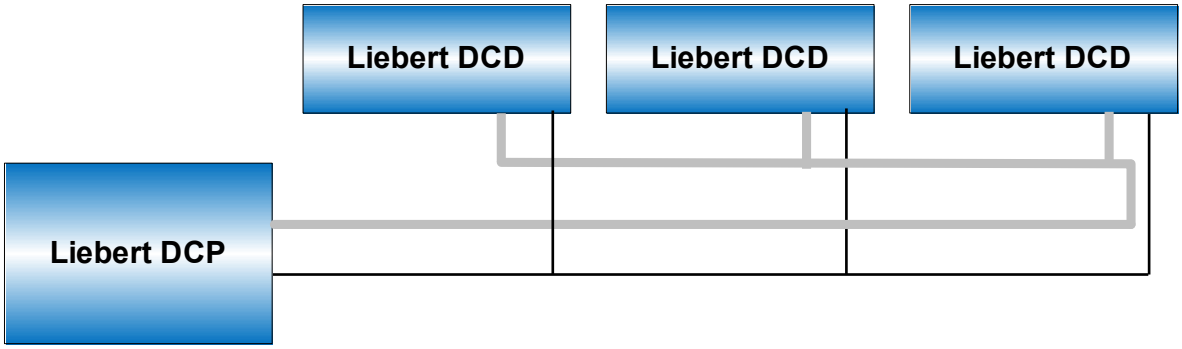
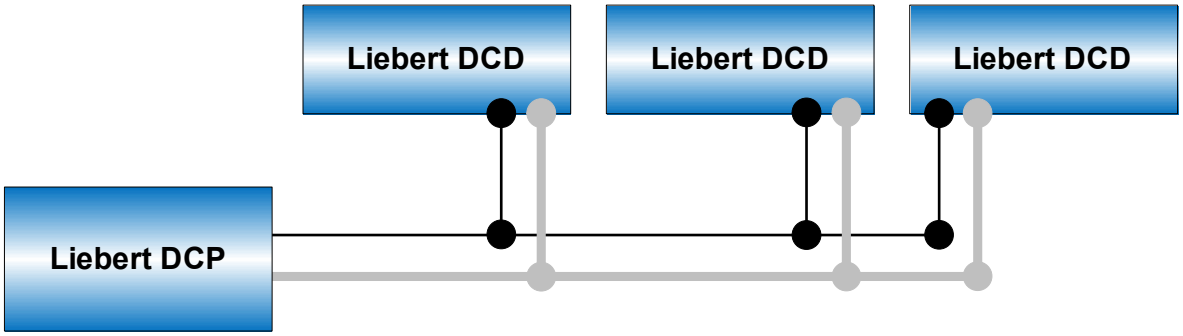


Figure 30 Tichelmann ring piping



However, if a ring configuration is not possible, connect the Liebert DCD units in a non-interlaced configuration as shown in **Figure 31**.

Figure 31 Typical Liebert DCD non-interlaced piping



5.2 Connection Methods and Points

Refer to site-specific drawings for general locations of the piping connections. For Liebert DCD connection locations, refer also to **Figures 32** and **33**.

The assembly and connection means used for piping the Liebert DCD system are the same as those used in conventional chilled water systems. Observe all standard practices during installation and startup to prevent damage and contamination. All piping must be ASTM Type L copper.

The Liebert DCD supply and return piping connection is 1" OD internal threaded copper pipe. Supply and return pipes are marked by labels on the unit itself. Torque for this connection is 147 lb/ft (200 Nm).

5.3 Floor Cutout Dimensions for Installation with Bottom Connections

Figure 32 Floor cutout dimensions, width 23-5/8" (600mm)

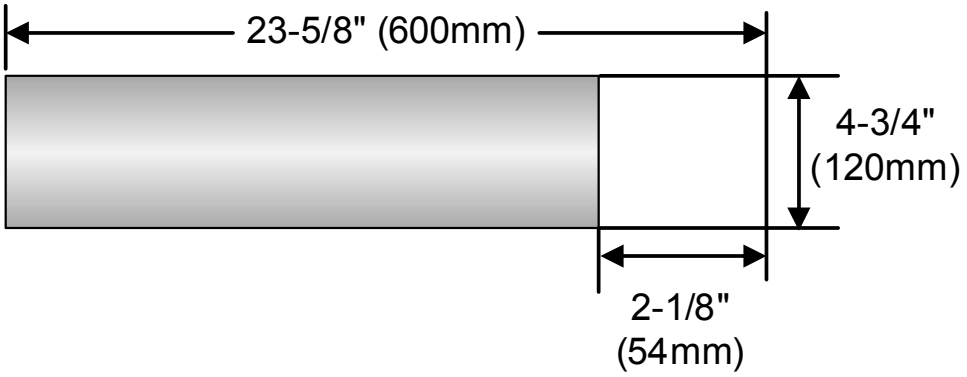
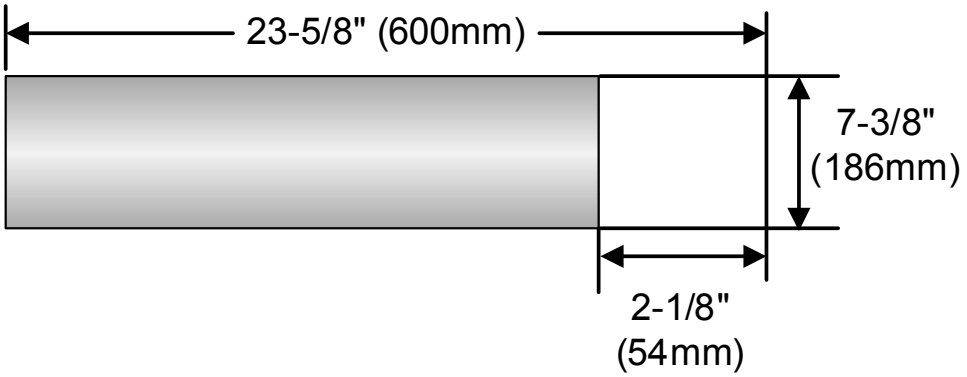


Figure 33 Floor cutout dimensions, unit with aluminum profile, width 23-5/8" (600mm)



5.4 Insulation

Insulate all piping for the Liebert DCD to minimize the possibility of condensation.

5.5 Chilled Water Distribution Units

Utilizing a chilled water distribution unit provides these benefits:

- Isolation of the building's chilled water circuit from the chilled water circuit within the data center. The Liebert DCP™ circulates the chilled water to Liebert DCD while preventing condensation by maintaining the water temperature above the room dew point.
- Ensures that the proper flow rate to the Liebert DCD is occurring. This is a critical factor in achieving and maintaining the needed capacity.
- Separation of the data center from the building chilled water circuit also minimizes the impact of a leak within the data center. Should a leak occur within the data center, the volume of water is limited to the amount within the secondary piping system instead of the entire building chilled water system.

5.5.1 Recommended Pipe Size

Elbows and restrictions should be minimized to establish sufficient fluid flow.

Table 5 Recommended pipe sizes

Piping Run	Nominal Pipe Size, inches
Supply or Return Mains	2-5/8
Supply or Return Branches >10 ft	1-3/8
Supply or Return Branches <10 ft	1-1/8

5.6 Open Loop Chilled Water Systems

Maintaining the proper chilled water flow rate is critical in achieving the Liebert DCD's design capacity. If a chilled water distribution unit, such as the Liebert DCP™, is not being used, steps must be taken to ensure the proper flow at the unit is maintained.

5.7 Chilled Water Connections

5.7.1 Strainer

Install a 20-40 mesh strainer on the chilled water supply to the Liebert DCP. The strainer is required to prevent particles in the chilled water from entering the Liebert DCP's heat exchanger. The strainer must be no more than 10 feet (3m) from the Liebert DCP.

5.7.2 Service Valves

Install 1" ball valves (field-supplied/field-installed) on the supply and return lines to the Liebert DCD to allow service on the unit without shutting down the entire system.

5.7.3 Balancing Valves

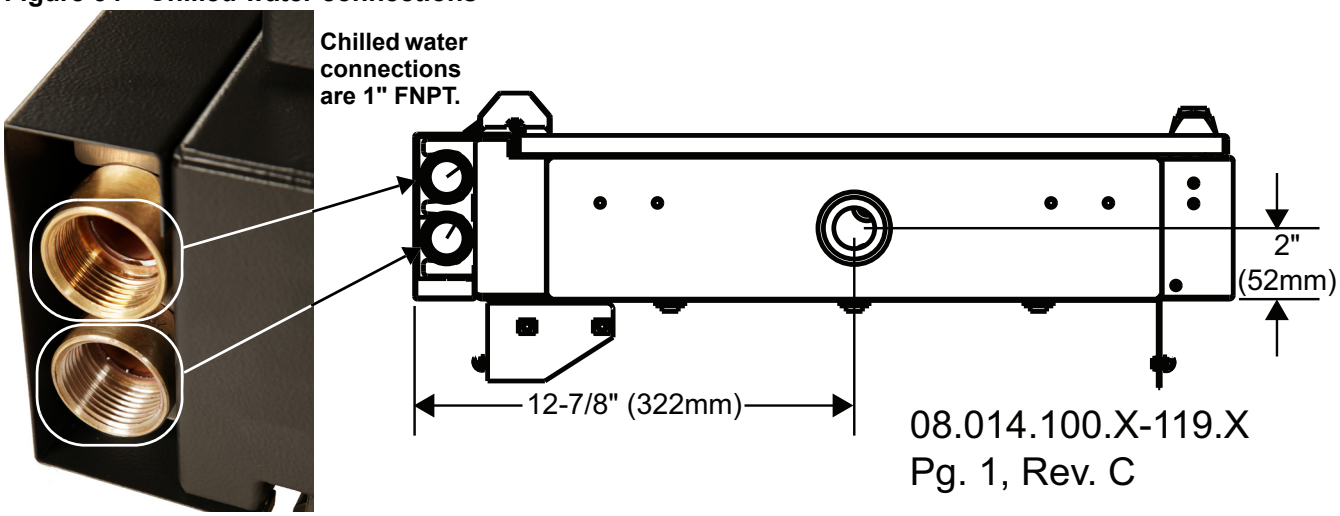
Install balancing valves (circuit setters) in the supply line to the unit. Refer to **8.2 - Capacity Performance** for the proper flow rate required to achieve the site-specific capacity

NOTICE

Risk of improper storage. Can cause frozen or damaged coil and piping, resulting in fluid leaks, equipment damage and serious building damage.

The heat exchanger and the piping must be cleared of any water before the unit is stored. Compressed air can be used to remove the water. Remove all the vents and the screws before storing. Emerson recommends storing of the module indoors protected from freezing, dampness and contact damage.

Figure 34 Chilled water connections



5.8 Flexible Pipes

Liebert DCD Flex Pipe kits are available in 10ft. (3m) in nominal length with quick connections (see **Figure 35**). The kit consists of the hose, a threaded adapter for to attach to the Liebert DCD and an adapter to connect to the field header.

Figure 35 Liebert DCD Flex Pipe connection kit and header adapter

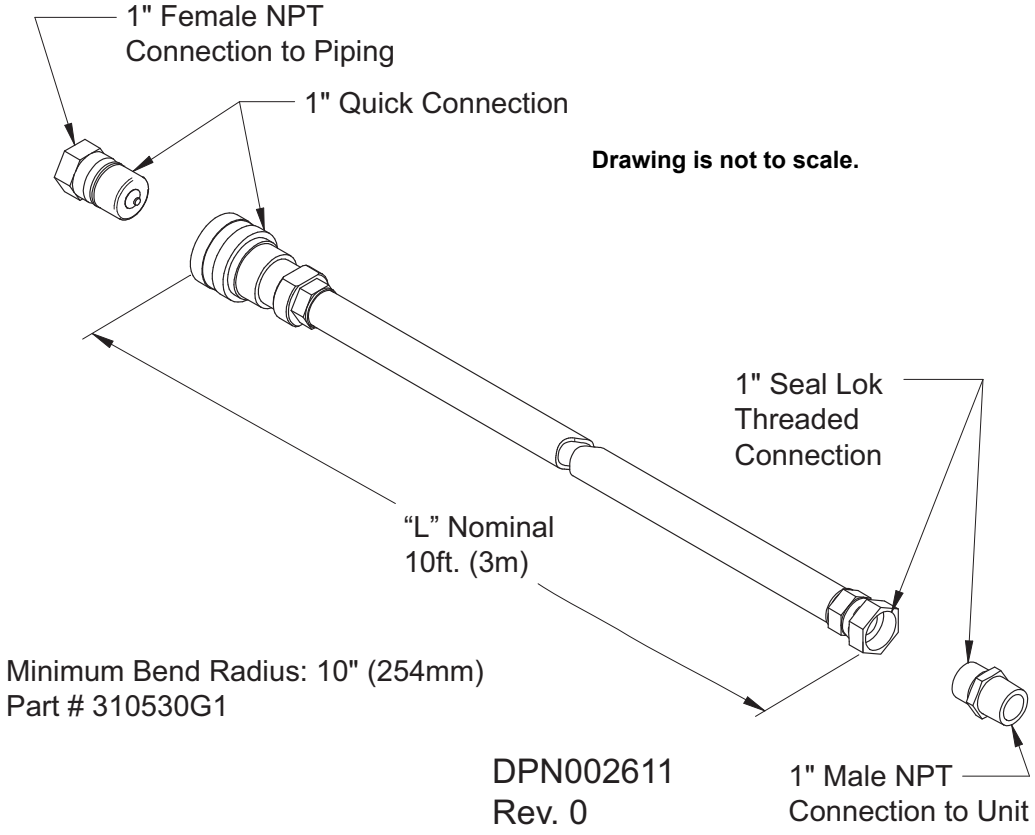
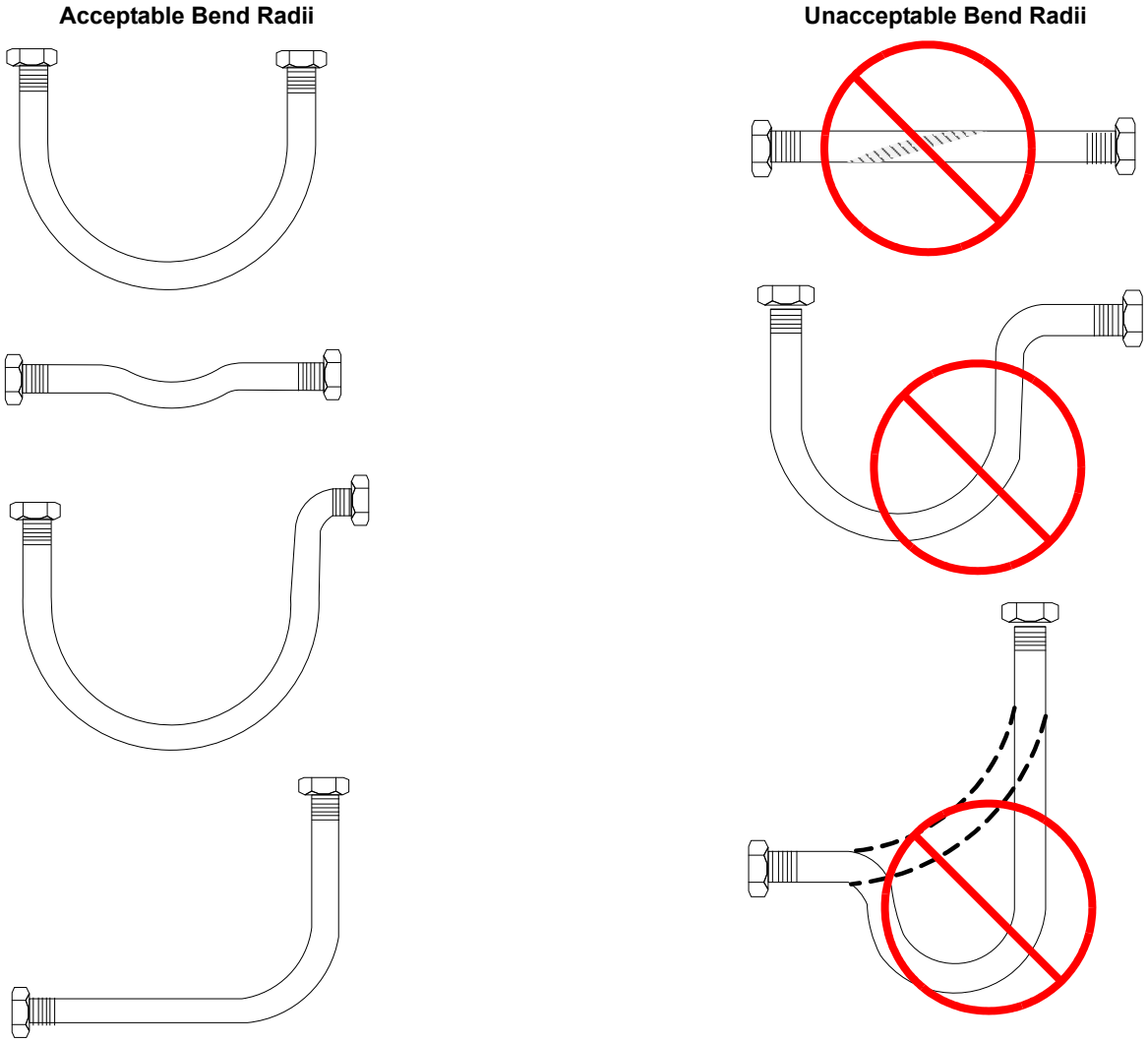


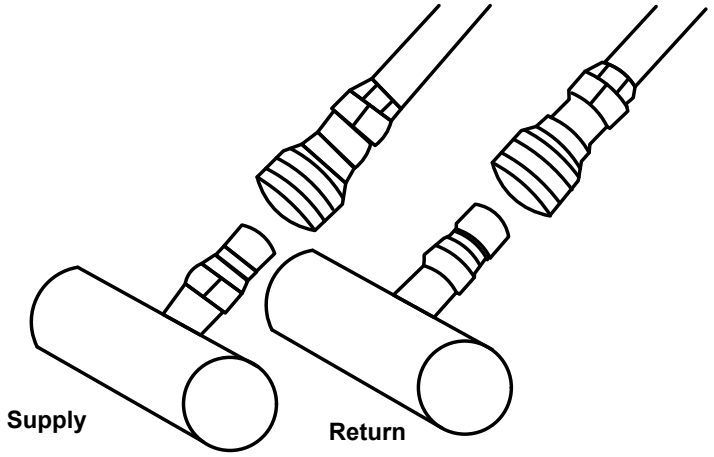
Figure 36 Pipe bend radius, acceptable and unacceptable



5.9 Connecting Liebert DCD Flex Pipe Hoses

1. Connect the supply hose header adapter to the supply header.
2. Connect the return hose header adapter to the return header.
3. Connect the supply hose door adapter to the Liebert DCD supply connection.
4. Connect the return hose door adapter to the Liebert DCD return connection.
5. Connect the hoses to the fittings. Tighten to 55 ft.-lb. torque. If a torque measuring device is not available, hand tighten the connection, then tighten an additional 1/2 flat (1/12 turn).
6. Connect the supply hose to the supply header (see **Figure 37**).
7. Connect the return hose to the return header (see **Figure 37**).

Figure 37 Hose connections to cooling water headers



5.10 Leak Checking

NOTICE

Risk of leaking water. Can cause equipment damage and serious building damage.

Check the chilled water system for leaks before commissioning. Check the chilled water pipe connection to the heat exchanger regularly. Tighten this connection if necessary.

When setting up the heat exchanger for the first time, inspect the mechanical condition of the chilled water supply and connection thoroughly.

- Confirm that the flow directions of field-installed components are correct.
- Confirm that all isolating valves are open.
- Test the water quality when filling the system (see **8.1 - Water Quality**)
- Set the pressure at 145 psig (10 bars) maximum for at least 30 minutes or according to local codes.
- Repair any leaks.

5.11 Filling the Unit

If using a chilled water distribution unit, such as the Knurr® CoolTrans™ or Liebert DCP™, refer to its user manual for instructions on filling the Liebert DCD™ and starting the system.

5.11.1 Bleeding Air from Liebert DCD

The Liebert DCD has two Schrader valves, one at the top and one at the bottom. The two valves permit rotating the Liebert DCD so that the unit may have bottom or top chilled water connections. Air trapped in the unit or piping must be bled from the valve at the top. Opening the lower valve will release water.

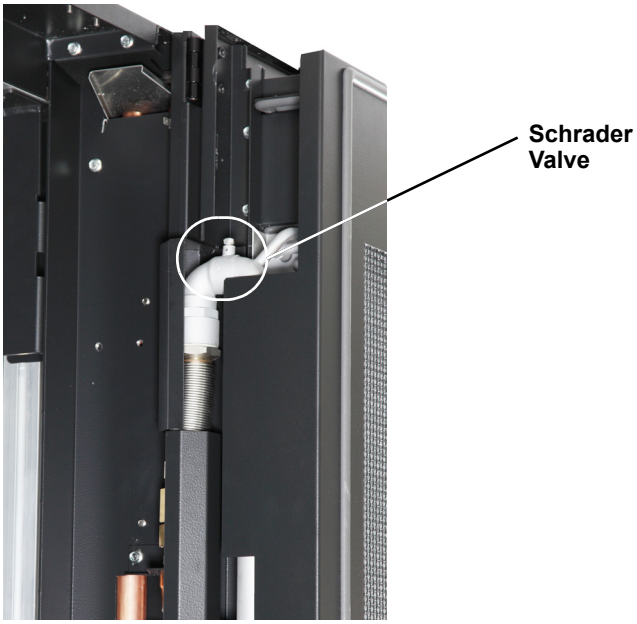
NOTICE

Risk of water release. Can cause equipment and building damage.

The Schrader valve at the upper side of the Liebert DCD must be used when bleeding air from the unit. Opening the lower Schrader valve will release water.

1. Find the Schrader valve at the top of the Liebert DCD, (see **Figure 38**).
2. Depress the pin to open the valve.
3. Keep the Schrader valve open until the water coming out has no bubbles.

Figure 38 Schrader valve location



6.0 INSTALLATION CHECKLIST AND SYSTEM FILL FOR STARTUP

Checks to be Performed	Done (to be signed upon completion)	Remarks
Check device for damage upon receipt		
Install and align to server cabinet		
Flexible hoses connected (optional) properly		
Packaging removed from the Liebert DCD		
All assembly tools removed		
Bushings installed properly		
Chilled water connections leak-proof / pressure-tested		
Air bled from coil		
Chilled water flow adjusted to proper flow rate		
Condensate line connected (if applicable) and routed to a suitable drain		
Unused server space is blocked with blanking panels		
Top and bottom of server cabinet are blocked and any cable entries are sealed to minimize air leakage.		

Location **Date** **Installer Signature**

Customer Site Name _____

Customer Site Address _____

_____

_____

_____

Site Contact _____

Phone Number _____

_____

Installer Name _____

Installer Address _____

_____

_____

Ambient Room Temperature **°F (°C)**

Room Humidity at Site of Commissioning **% Relative Humidity**

Liebert DCD Serial # _____

Comments _____

Check of alignment	Yes	No
Shipping damage	Yes	No
If yes, has the shipper been notified	Yes	No
Residual packaging removed	Yes	No
Assembly tools removed	Yes	No

Table 6 Building chilled water system

Chilled Water	With Glycol		Glycol Type	
	Without Glycol			
Liebert DCD				
Connected to	Building Chilled Water?		Liebert DCP™	
Chilled Water Temperature (primary)	Supply	°C	°F	
	Return	°C	°F	
Chilled Water Pressure	Supply	bar	Supply	psi
	Return	bar	Return	psi
Connection	Liebert DCD Flexible Hose			
	External Flow Regulator			
	External Isolation Valves			

Mechanical Functions				
Damage to Heat Exchanger/ Connections/ Fins/Tubes/Surface		None		Existing
Remarks				

Thermodynamic Checks				
Pipe Duct Inlets/Cable Sealed		Yes		No
Remarks				

Condensed Drain Connected		Yes		No
Remarks:				

Thermodynamic Checks				
Condensate on Coil Surface		Yes		No
Remarks				

Chilled Water Entering Heat Exchanger		°F		°C
Chilled water leaving heat exchanger		°F		°C
Cabinet Temperature in Front of Heat Exchanger		°F		°C
Cabinet Temperature Behind of Heat Exchanger		°F		°C
Chilled Water System Bled		Yes		No
Chilled Water System Pressure Tested		Yes		No
Proper Chilled Water Flow Rate Set to Liebert DCD		Yes		No
Volume Flow		GPM		External
		l/m		External

Correctness of values above is hereby affirmed

Startup Performed By	**Date**	**Signature**
Customer	**Date**	**Signature**

7.0 MAINTENANCE

CAUTION

Risk of improper repair and maintenance. Can cause reduced unit performance, equipment damage and injury.

All maintenance and repair jobs must be performed by properly trained and qualified personnel. Wear OSHA-approved head and eye protection, gloves and arm protection when performing repairs and maintenance.

Close off the coolant fluid supply valve and relieve coolant fluid pressure before disconnecting piping connections. All actions must be in accordance with regulations and the manufacturer's instructions. Use only Emerson-approved tools and parts for maintenance and repair.

NOTICE

Risk of dirty heat exchanger. Can cause reduced unit performance (increased pressure drop or poor heat transfer).

Clean the heat exchanger fins with a a vacuum cleaner, soft brush or compressed air.

7.1 General Maintenance

___ 1. Check the heat exchanger for dirt and debris.

___ 2. Check functionality of the isolation valves.

___ 3. Check the chilled water system for leaks.

8.0 SPECIFICATIONS

Table 7 Liebert DCD35™ specifications

Housing Material	Steel Plate
Coil Material	
Ambient Operating Temperature °F (°C)	50 - 95 (10 - 35)
Maximum Absolute Humidity	8 g/kg
Dimensions, Door Only, inches (mm)	
Height	78-3/4 (2000)
Width	23-5/8 (600)
Depth	6 (151)
Dimensions, Door with Aluminum Profile, inches (mm)	
Height	78-3/4 (2000)
Width	23-5/8 (600)
Depth	7-3/8 (186)
Shipping Dimensions, inches (mm)	
Height	24" (610)
Width	36" (914)
Depth	91 (2311)
Weight, lb (kg)	
Unit Only	200 (90.7)
Shipping	375 (170)
Chilled Water Connections	
Chilled Water Supply	1” NPT
Chilled Water Return	1” NPT
Chilled Water Entering Temperature, °F (°C)	53.6°F - 64.4°F (12°C - 18°C)
Chilled Water Leaving Temperature, °F (°C)	64.4°F - 75.2°F (18°C - 24°C)
Maximum Operating Pressure bar (psi)	145 (10)
Exterior Finish	Black Matte, Heat-Fused Powder Coat
Safety	CSA Approved

Table 8 Replacement parts an accessories

Part Name	Part #	Quantity Required per Unit
Replacement Parts		
Top Swivel Cover (Attaches to Frame)	309617P5	1
Bottom Swivel Cover (Attaches to Frame)	309617P6	1
Top Swivel Cover (Attaches to Door)	309617P7	1
Bottom Swivel Cover (Attaches to Door)	309617P8	1
Self-Adhesive Foam	309894P3	1
Fiber Washers	310741P1	2
Condensate Hose Adapter	080090620	1
Spring Nuts	000782699	16
Diamond Nuts	000770869	7
Grounding Wire	000797999	1
	000798169	1
Accessories		
Flexible Hose Kit	310530G1	1

8.1 Water Quality

To safeguard the maximum lifetime of air/water heat exchangers, the water used for chilling purposes must meet the VGB Chilled Water Guidelines (VGB-R 455 P). The chilled water used must be soft enough to prevent deposits, but it must not be too soft because that would lead to corrosion of the heat exchanger.

Table 9 lists the most important impurities and measures for their removal.

Table 9 Water Impurity

Water Impurity or Condition	Corrective Method
Particles (dp < 0.3 mm)	Filter the water
Excessive hardness	Soften the water by ion exchange
Moderate level of particles and hardeners	Add dispersion or stabilization agents
Moderate level of chemical impurities	Add deadening agents and inhibitors
Biological impurities (bacteria and algae)	Add biocides

Emerson recommends treating water to it get as closest as possible to the values in **Table 10**

Table 10 Hydrological data

Hydrological Data	Recommended Purity Levels
pH values	(7 - 10,5)
Carbonate hardness	(3 - 8) °dH
Free carbon dioxide	(8 - 15) mg/dm3
Combined carbon dioxide	8 - 15mg/dm^3
Aggressive carbon dioxide	0mg/dm^3
Sulfides	< 10mg/dm^3
Oxygen	< 50mg/dm^3
Chloride ions	< 250mg/dm^3
Sulphate ions	< 10mg/dm^3
Nitrates and nitrites	< 7mg/dm^3
COB	< 5mg/dm^3
Ammonia	< 5mg/dm^3
Iron	< 0.2mg/dm^3
Manganese	< 0.2mg/dm^3
Conductivity	< 30S/cm
Solid residue from evaporation	< 500mg/dm^3
Potassium manganese consumption	< 25mg/dm^3
Suspended matter	< 3mg/dm^3
Partial Flow Cleaning Recommended	3 -15 mg/dm^3
Full Flow Cleaning	> 15mg/dm^3

8.2 Capacity Performance

Figure 39 Performance @ 5.2m^3/h

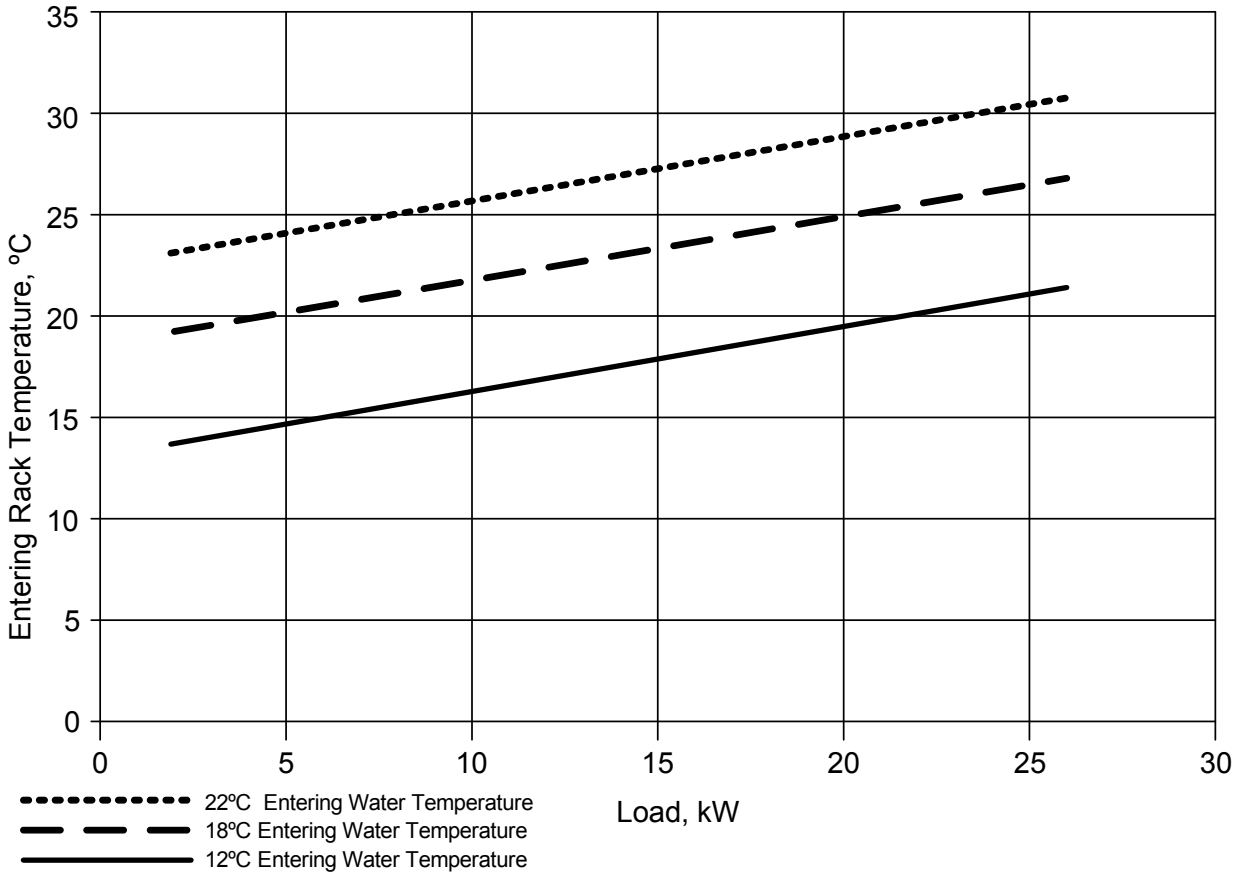


Figure 40 Performance @ 22.9 US GPM

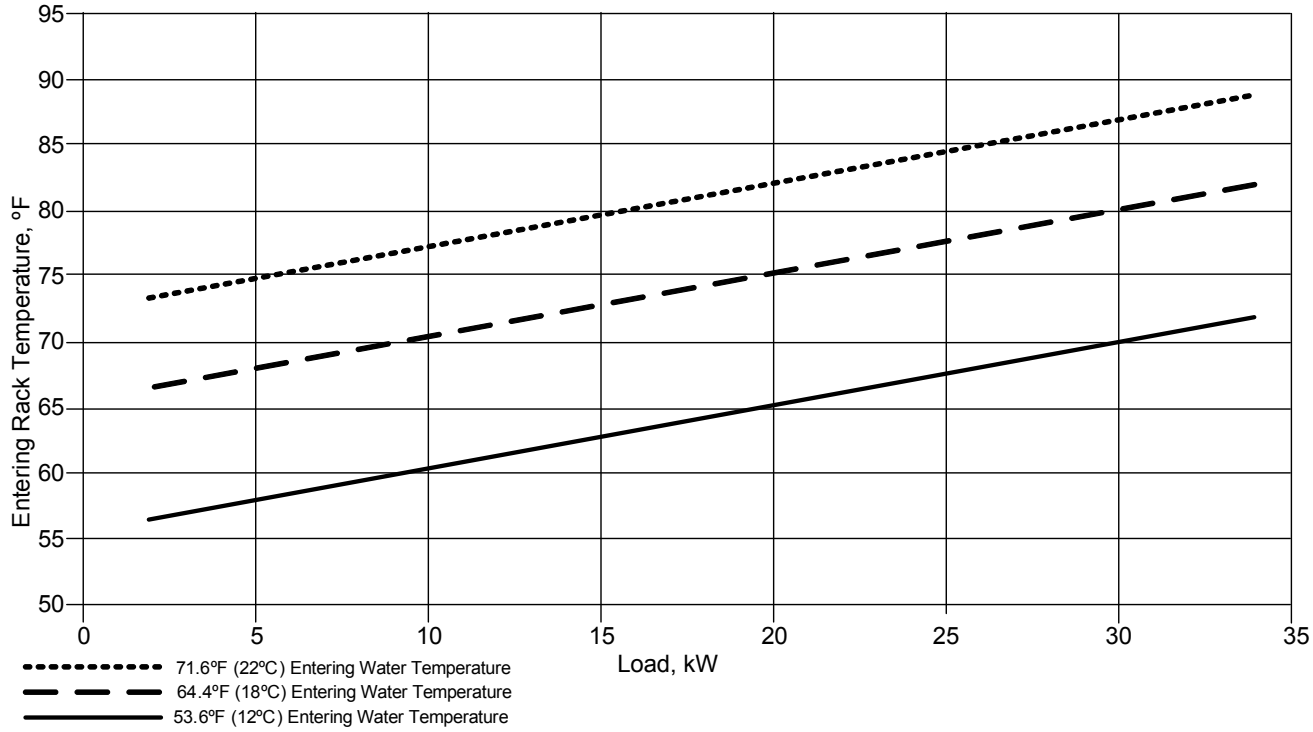

Entering Rack Temperature, °F
Load, kW
71.6°F (22ºC) Entering Water Temperature
64.4°F (18ºC) Entering Water Temperature
53.6°F (12ºC) Entering Water Temperature

Figure 41 Performance @ 3.5 m^3/h

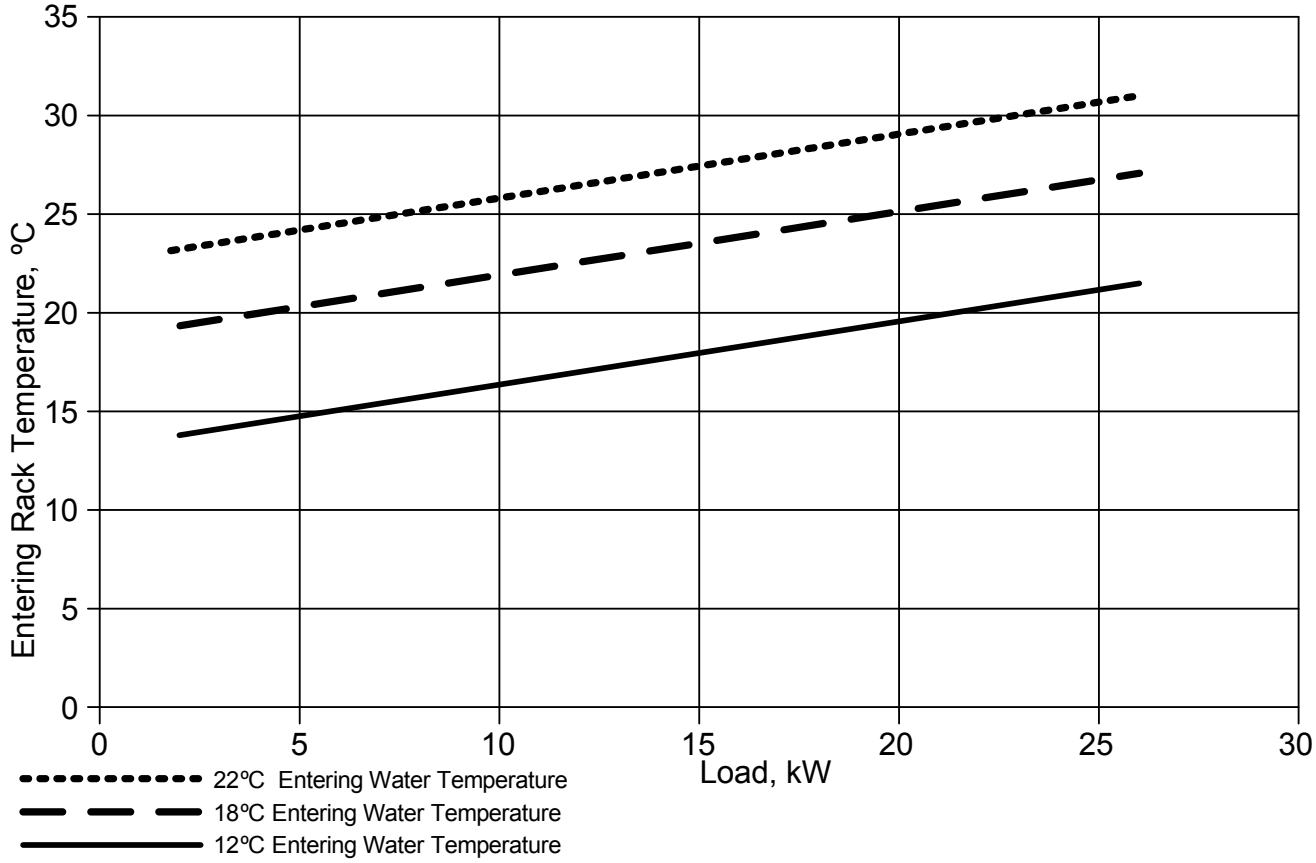


Figure 42 Performance @ 15.4 US GPM

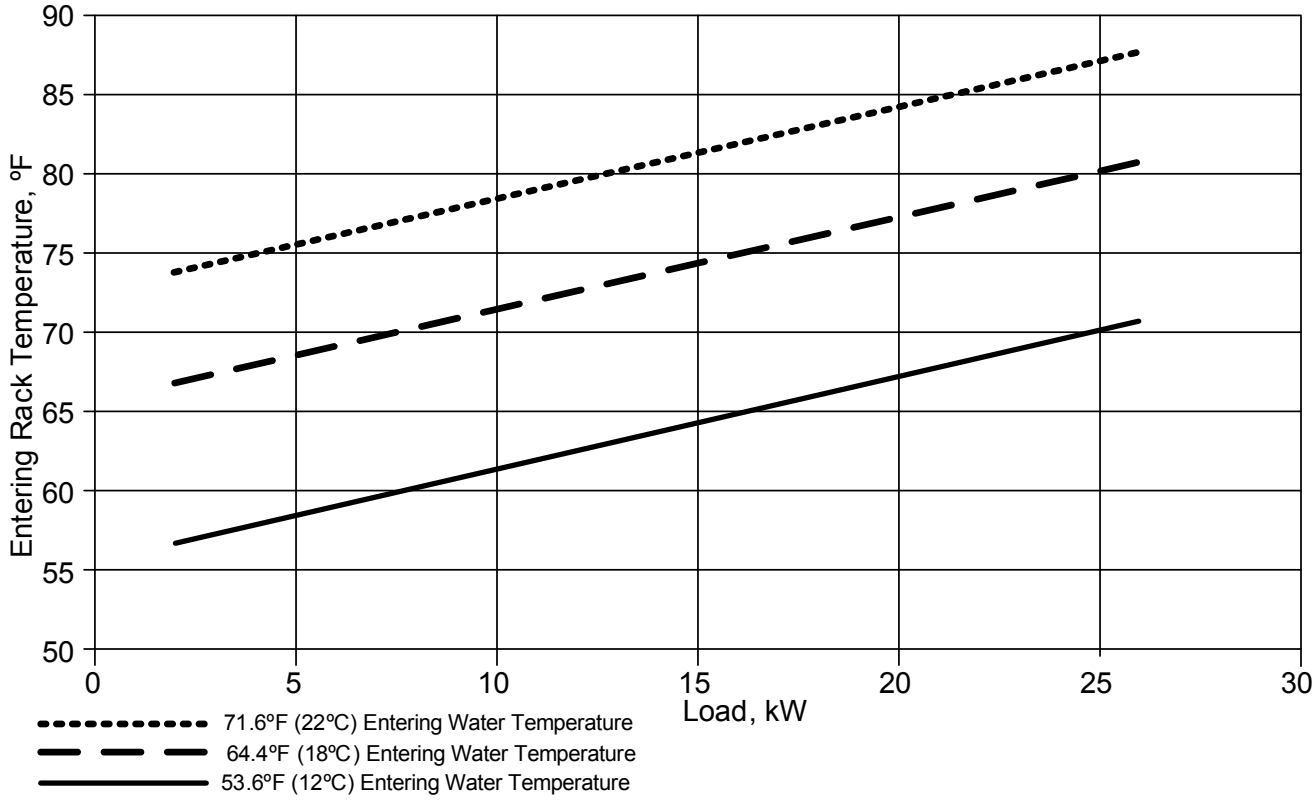


Figure 43 Performance @ 1.8 m^3/h

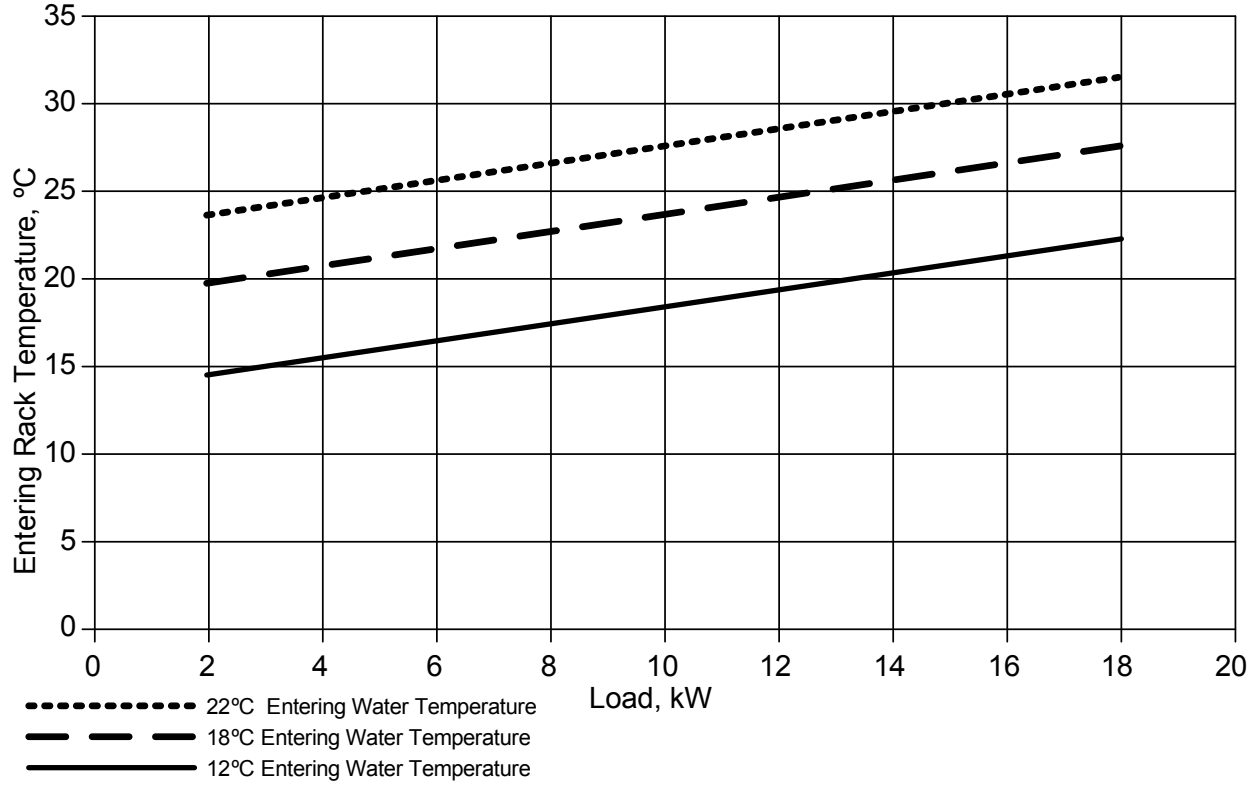


Figure 44 Performance @ 7.9 US GPM

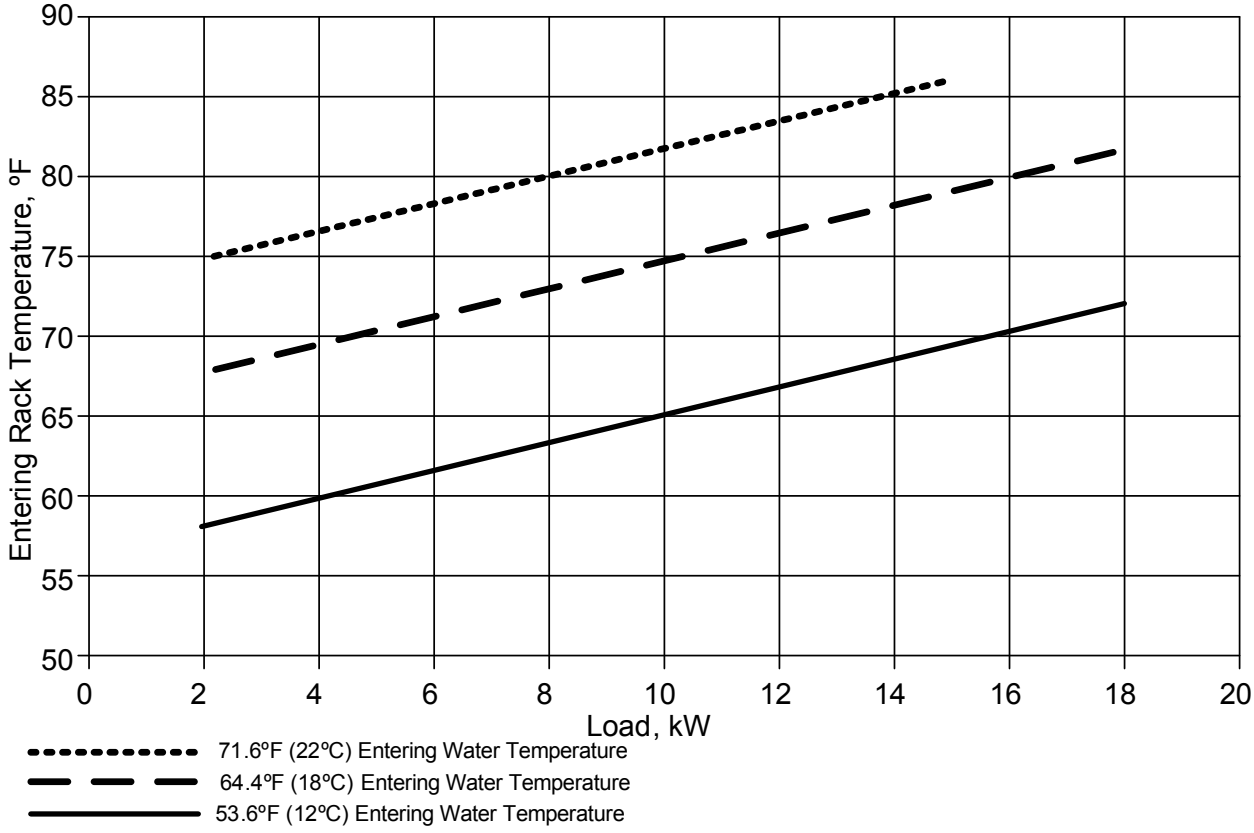


Figure 45 Air-side pressure drop

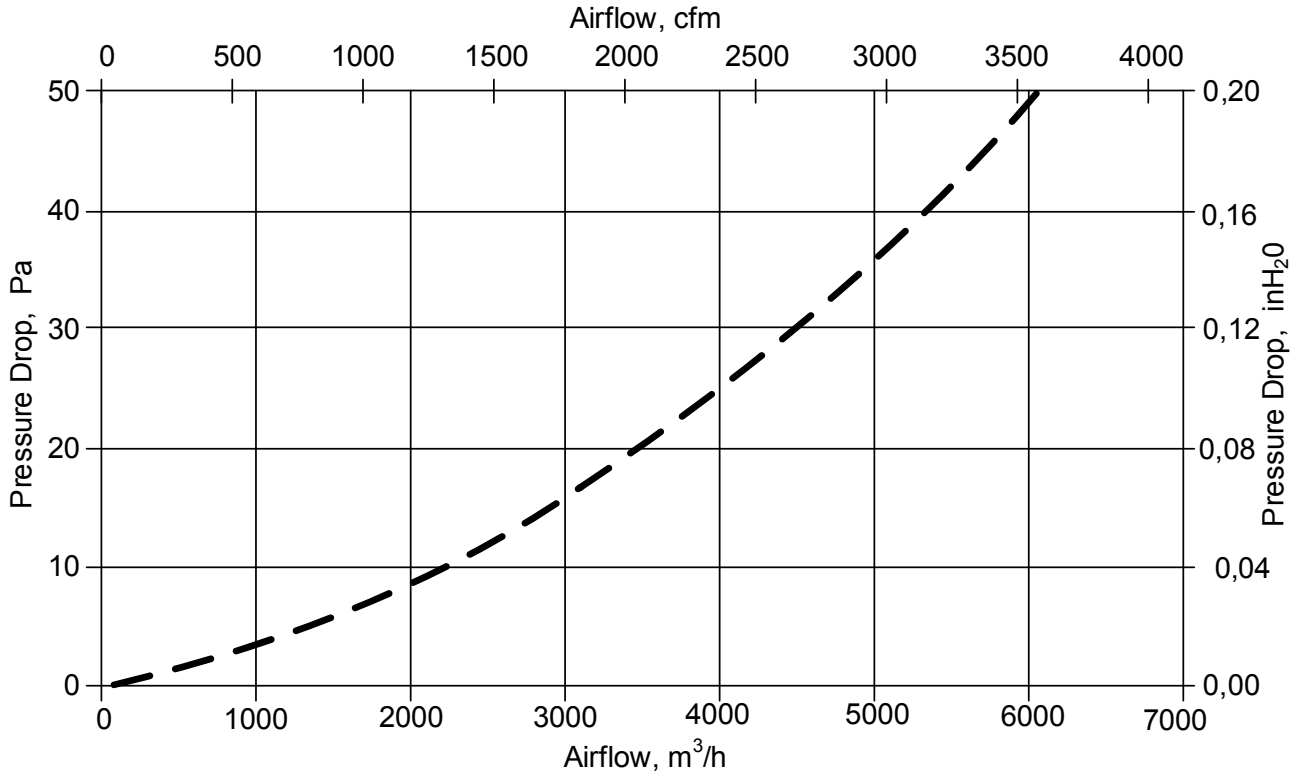
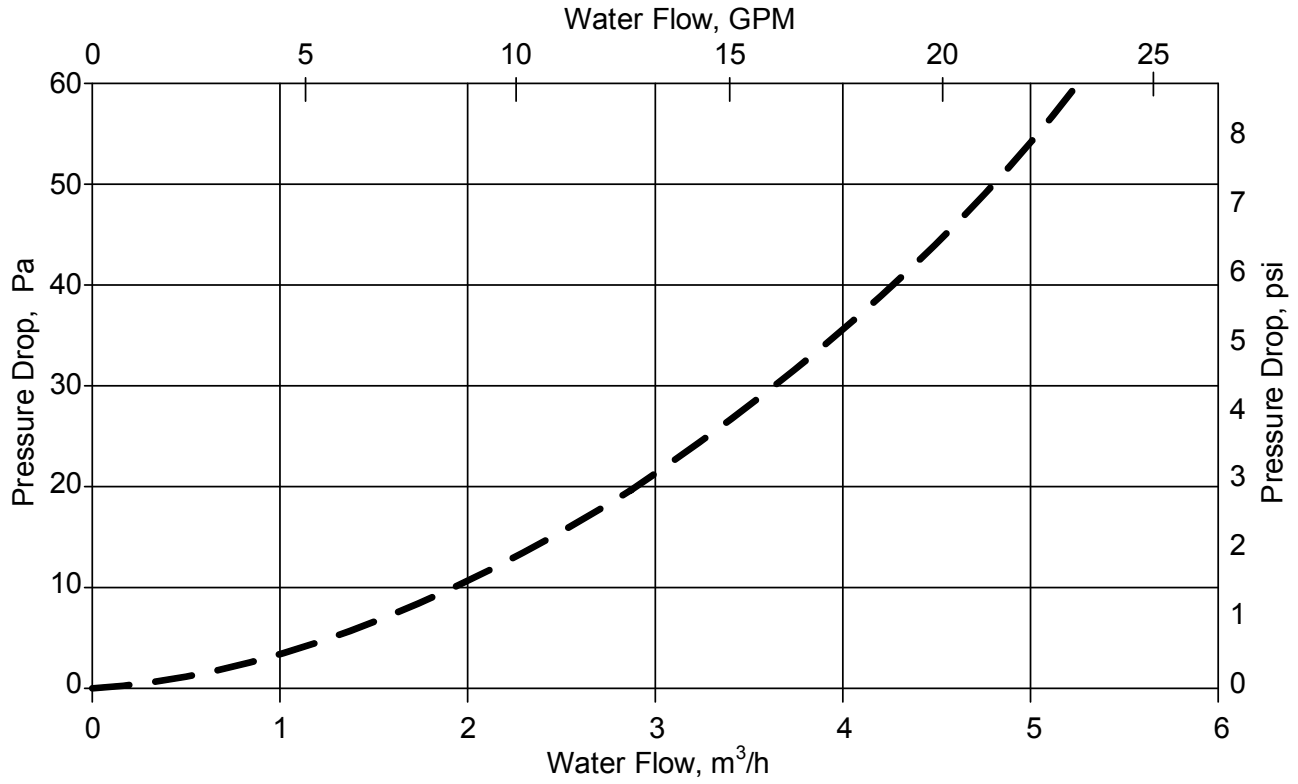


Figure 46 Water-side pressure drop



NOTES

COMPLIANCE WITH EUROPEAN UNION DIRECTIVES

Fabbricante – Manufacturer – Hersteller – Fabricant – Fabricante
Fabricante – Tillverkare – Fabrikant – Valmistaja – Produsent
Fabrikant – Κατασκεναστηζ – Producent

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Il Produttore dichiara che, se munito di marchio CE, il prodotto è conforme alle direttive dell'Unione europea:

The Manufacturer hereby declares that this product, when bearing the CE mark, conforms to the European Union directives:

Der Hersteller erklärt hiermit, dass das vorliegende Produkt, sollte es die CE-Kennzeichnung tragen, den folgenden Richtlinien der Europäischen Union entspricht:

Le fabricant déclare par la présente que ce produit, portant la marque CE, est conforme aux directives de l'Union européenne :

El fabricante declara por la presente que si este producto lleva el marcado CE es conforme con las directivas de la Unión Europea:

O fabricante declara por este meio que este produto, quando ostenta a marca CE, está em conformidade com as directivas da União Europeia:

Tillverkaren tillkännager härmed att den här produkten, när den är CE-märkt, överensstämmer med EU:s direktiv:

De fabrikant verklaart hierbij dat dit product, indien het van de CE-markering is voorzien, conform de EU-richtlijnen is:

Valmistaja vakuuttaa täten, että mikäli tuotteessa on CE-merkintä, se täyttää seuraavien EU-direktiivien vaatimukset:

Produsenten erklærer herved at dette produktet, når det er CE-merket, er i samsvar med EU-direktiver:

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Ο Κατασκευαστής δηλώνει ότι το προϊόν αυτό, το οποίο φέρει σήμανση CE, είναι σύμμορφο με τις οδηγίες της Ε.Ε.:

2006/42/EC; 97/23/EC

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